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AN INFORMAL REPORT ON OTOLARYNGOLOGY
IN THE FIRST YEAR OF THE WAR.*

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This paper deals with the following subjects: The activities during the past year of the Section of Surgery of the Head; the Base Hospitals at the cantonments, some gossip about them, and the medical problems of the cantonments; the present and future needs of otolaryngology as to personnel; and finally, a few comments on the character of the medical work in the army and why the writer believes that it is a grown man's work and not, as it has been dubbed by a few of the present stay-at-homes, work to be done by boys.

The writer's duty up to the present time has been largely in recruiting medical personnel for otolaryngology. This

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naturally has aroused deep feeling, and the closing paragraphs, I am conscious, are at least reminiscent of this feeling.

ACTIVITIES OF THE DIVISION OF SURGERY OF THE HEAD.

During the war the interests of ophthalmology and otolaryngology have been cared for in two ways. First, a committee for each specialty was organized under the Council of National Defense. These committees were responsible for sending out questionnaires, and tabulating the returns and helping with the first assignment of personnel. The second method of caring for the interests of the two specialties was the assigning of two members from the original committees of the Council of National Defense, one for ophthalmology and one for otolaryngology, as official members of the Surgeon General's office. A section of surgery of the head was then organized, Major Blair and Major Bagley completing the section, the first representing oral and plastic surgery and the second brain surgery. Colonel Lyster became the head of the section; but Colonel Parker who, since last October, has been the acting chief, has recently been officially placed in charge. The men assigned to the Surgeon General's office for the division of surgery of the head naturally consult and work in harmony with the parent committees of the Council of National Defense. The Council of National Defense, however, has always been an advisory body and, from the nature of things, can be nothing else. The officers in the Surgeon General's office naturally avail themselves of its counsel, but the division of surgery of the head is the only legal body, so to speak, that deals with the affairs of otolaryngology, ophthalmology, oral and plastic surgery and brain surgery. Surgery of the head is classed as a separate division in the Surgeon General's office, but in the field as one of the sections of the surgical division, the other sections in this division being general surgery, orthopedic surgery, genitourinary surgery and roentgenology.

The original committee of the Council of National Defense for otolaryngology was Dr. Charles W. Richardson, chairman, Dr. Burt R. Shurly and Dr. H. P. Mosher—Colonel T. C. Lyster, representing the army, and Surgeon G. B. Trible, representing the navy, were soon added. After serving on the committee a few months Dr. Shurly resigned in order to go

overseas in charge of a base hospital, and his place was taken by Dr. Joseph H. Bryan.

The medical officers composing the division of surgery of the head, working with the committee of the Council of National Defense, further classified the names sent in in response to the questionnaires; planned a special head building for the cantonments; selected instruments and advised in the selection of the personnel for the cantonment base hospitals in this country and for the base hospitals abroad. An investigation of ear protectors was carried out under the direction of Major Richardson. Naturally there were many other activities in which they took part but those just mentioned are the main ones.

In the latter part of October, 1917, Colonel Lyster, Major de Schweinitz, Major Mosher and Major Jones were ordered overseas for two months' temporary duty. During Major Mosher's absence Major C. W. Richardson took his place in the office of the Surgeon General. Before the party sailed overseas Major Richardson was given charge in the Surgeon General's office of the reeducation of the deaf, and Dr. Max A. Goldstein came into the service in order to be associated with this work. Dr. H. W. Loeb also came into the service and was assigned the position of editor of a war manual for otolaryngology. He spent some time in Washington collecting data, and then returned to St. Louis and continued his work there. The volume on which he has been working for the past months consists in the main of abstracts of the war literature with comments. This is to be followed by a condensed operative manual. In addition, there will appear a volume of abstracts of recent war literature dealing with the specialties which compose the division of surgery of the head. This volume of contemporary abstracts will appear at intervals, it is hoped, for the duration of the war.

The section of brain surgery has conducted a neurologic school in Philadelphia, New York and in Chicago. The section of oral and plastic surgery has had a school in St. Louis and one in Chicago. Neither the section of ophthalmology nor the section of otolaryngology has undertaken separate schools, feeling that the making of competent specialists in these two lines was not a matter that could be satisfactorily accomplished in a short period of a few months.

The whole subject of medical instruction in the army, however, is now being coordinated by a school of instruction just starting at the Officers' Training Camp at Camp Greenleaf. All branches of medicine and surgery are to be taught there, or rather reviewed. The specialties which represent the section of surgery of the head are, of course, to have their representatives. Major Thomas J. Harris is to take charge of otolaryngology. Military necessity permitting, this course is to cover a period of some three months.

A hospital for the surgery of the head has been started at Cape May. It is planned to send appropriate cases there as they return from overseas, and it is to act as well as the hospital of last resort for head cases occurring in the hospitals in this country. The staff will be a brilliant one. Two staffs are contemplated—one to go abroad when the call comes, and the other to continue the work when it leaves. A corps of specially trained nurses has been at Cape May for some months. A small number of cases is already under treatment there, some thirty of which have returned from overseas. The building used for the hospital is a hotel which did not pay until taken over by the Government. It will hold about 500 patients and is beautifully situated. The staff is eagerly awaiting the full equipment and the full number of patients. In the meantime the attractive bathing facilities help while away the time.

Major Greenwood has just landed overseas in charge of a number of optical units, and Major Blair is also overseas, having crossed in charge of oral and plastic units which were requested by General Pershing. Lieut.-Col. de Schweinitz for the moment is taking Lieut.-Col. Black's place in the Surgeon General's office while he is on a western inspection trip. Lieut.-Col. Mosher is looking after otolaryngology, Major Bagley brain surgery, and Major Ivy is taking Major Blair's place in charge of oral and plastic surgery. The chief work of all these men is to get adequate personnel and to place it to the best advantage. In addition, as stated above, publications of war literature have been issued, schools established, students assigned to them, proper teachers obtained and the courses supervised. The main work always has been and will be until the end, the delicate work of choosing and caring for the per-

sonnel. If I may be permitted to say so, firmness, judgment and tact and, as far as possible, an individual knowledge of the applicants, are essential for even a partial success at this undertaking. Having charge of personnel in many ways is not an enviable position.

The section of surgery of the head has for purposes of administration an independent existence in the Surgeon General's office and a semi-independent existence in the base hospitals. The main services in a base hospital are medicine, surgery and laboratories. The section of surgery of the head is classed, like general surgery, orthopedic and genitourinary surgery, as a section of the surgical service. The chief of any section may be selected chief of the surgical service. The chief of the section of surgery of the head has been selected as chief of the surgical service twice—Major Ellett, at Camp Meade, and Major Todd at Des Moines. The chief of the section of surgery of the head, the chief of general surgery, the chief of orthopedics and the chief of genitourinary surgery, as well as the chief of roentgenology, alike report to the chief of the surgical service, whose duty it is to coordinate the work of the whole service.

As a matter of fact, in most cases it has worked out that the section of surgery of the head has been allowed practically an independent career.

The section of the surgery of the head is gradually achieving a position abroad much like the position which it holds in the Surgeon General's office. Its influence is markedly felt there, because each base hospital that goes overseas has an ophthalmologist, an otolaryngologist, an oral and plastic surgeon and a brain surgeon selected for it in the Surgeon General's office. Major Blair, who, as I said, has just landed overseas, has been appointed by the chief surgeon, A. E. F., as consultant for oral and plastic surgery for the forces abroad. Major McKernon, of the Postgraduate Base Hospital, who has been in France now for a year, has been appointed consultant for otolaryngology, and richly deserves it. Major Greenwood has been appointed consultant in ophthalmology. Major Cushing has been appointed consultant in brain surgery.

Base Hospital No. 115, which is practically a head hospital, has just been asked for by cable.

OBSERVATION TRIP OVERSEAS.

Now a few words about the trip abroad of three of the members of the section of surgery of the head, and Major Jones. Colonel Lyster went with the double interest of the medical care of the flier and the use of the specialists; Major Jones went in the interest of the medical care of the flier, and Lieut.-Col. de Schweinitz and Lieut.-Col. Mosher represented ophthalmology and otolaryngology, respectively. The party was away four months. They spent a little over two months in France, with Paris as their headquarters, and came back by way of England, staying there a short time. Lieut.-Col. de Schweinitz and Lieut.-Col. Mosher paired off and traveled together amicably; Colonel Lyster and Major Jones, for the most part, traveled together, except when Major Jones, during the latter part of the trip, went alone into Italy. While the hoped-for results and those actually obtained did not always correspond, its members brought back much first hand information which has since proved very useful, and more than one suggestion made by the members of the party has since been put into operation.

Lieut.-Col. de Schweinitz and Lieut.-Col. Mosher visited the English hospitals, where there were special eye centers, or centers for oral and plastic surgery. Otolaryngology is not yet recognized as a specialty in the English army, and there were no centers to visit. In the English army the eye service is well organized. Next in excellence of organization come the oral and plastic centers, of which there are two in France and one in England. Next the observers visited an advanced part of a French hospital sector. In this they found that the surgery was largely specialized. For instance, at one hospital of three thousand beds, twelve miles from the line, thoracic surgery and brain surgery were done by one man, bone and joint surgery by another, and wounds of the soft parts by a third surgeon. It was learned that early and thorough surgery had almost eliminated sepsis and that the Carrel treatment was seldom necessary. In this same sector, at a city perhaps thirty miles from the line, a special hospital for head

cases was found and a special hospital for fractures. In other words, the French were everywhere specializing their surgery as much as possible. Major Jones, as I said, was the only one of the party to go into Italy. On his return he confirmed what we learned from other observers who had been there, that the Italians have gone even further than the French in specializing their surgery. Everyone who goes to Italy comes back greatly impressed with the efficiency of the Italian surgery.

We reached France at a time when the American base hospitals were just getting on their feet. The first period of organization was over, and they were getting their final buildings under way. It is no secret that lumber was scarce. The initial buildings, therefore, of almost every base hospital were summer hotels or French schools or monasteries. Most of these the French already used as hospitals. The French, however, turned them over to the Americans, who at once began to build additions in the shape of wooden huts. None of the American hospitals had been doing much surgery up to the last of February, the time we left, except one that was situated far north, and the surgery there was civil surgery. Most of the American base hospitals were principally occupied treating infectious diseases, of which they had a good supply, and pneumonia. The plan was just being put in operation of sending from each hospital an operating team to the Casualty Clearing Stations of the English and French, a plan copied from the English. It really will save the day, because without it the hospitals at the coast will never see any surgery but remain as they were when we saw them, hospitals for treating cases of infectious diseases coming off the transports, and convalescent hospitals for cases sent back from the hospitals more fortunately situated.

Naturally we became very much interested in the whole question of hospital organization and management. Besides reporting on how the specialties were cared for by the English and French, we reported on this larger subject to the chief surgeon, A. E. F., and later to the Surgeon General. The chief recommendations of the report were that base hospitals should be placed as far forward as possible and that they should have radial control; that a consultant should be appointed for each

branch of medicine and surgery, and for each of the components of the section of surgery of the head; that a chief should be appointed for the section of surgery of the head, and a special head hospital established at a fitting time. Further the report urged that operating teams should be sent to the Casualty Clearing Stations as a routine from each base hospital, and that centers of instruction in brain surgery, oral and plastic surgery and the surgery of the eye and ear be established. The operating teams were being started, and some of the teaching centers were roughly in operation when we left. It was recommended that whatever consultants were appointed should supervise a sector radially from the front to the rear and be responsible from the front to the rear for the continuity of the treatment.

We learned, somewhat to our astonishment, that the greatest wastage of men in the various armies was caused by common and rather undignified diseases, namely, by trench fever, due to the louse, and by boils and scabies. We found that last winter very many of our men were landed overseas ill with bronchitis or influenza or soon came down with these diseases. When we left a formidable committee headed by Major Strong was preparing to exterminate the louse.

THE MEDICAL PROBLEMS OF THE CANTONMENTS.

Much that I have to say about the cantonments is already familiar to you because they are all so nearly alike, and everyone here must have visited at least one of them. As you know, they are small cities with a population of twenty to forty thousand. Although they were built in a few months, they have all the appointments of cities of years of growth, from churches to jails, and from libraries and theaters to fire engine houses. They are cities of youth, and poverty and old age are never seen. Except for the nursing staff women play no part in them. In the normal cycle of a man's life death alone is present.

At these cantonments there are sixteen base hospitals for the National Army and fifteen for the National Guard. Besides these, there are scattered over the country general hospitals, post hospitals and special hospitals. One of the special

hospitals is being fitted out as a hospital for head surgery. Reconstruction hospitals and hospitals for reeducation are soon to come. The number of beds in the cantonment base hospitals varies between 1,000 and 2,000, the beds in the general and post hospitals from 150 to 500. One special hospital for tuberculosis has 1,000 beds, and the hospital for head surgery has a maximum capacity of 500. Up to the present time the total number of beds planned for in this country is over 70,000. I am not at liberty to give even approximate figures, such as the ones just given, for the hospitals contemplated and actually built abroad, but the American public can rest assured that there will be an adequate number.

In the cantonment base hospitals the death rate is of course low, because the soldier citizens were chosen as physically fit before they took up residence there. The sick rate also should be low, and is low, but a curious fact, well known to all experienced medical men in the army, soon became evident—namely, that the grouping of these apparently well young men was at once followed by epidemics of disease. The infectious diseases of childhood at once appeared and took a very virulent course. Pneumonia, the friend of the old, became the deadly enemy of the young. Cerebrospinal meningitis, which is relatively rare in civil life, became almost common.

An apparently well man is often a carrier of bacteria which he gives to his fellows. Men who have long lived together, however, seem to acquire an immunity to each other's bacteria; but take men who are strangers and assemble them in large numbers, as they are today assembled in the cantonments, and infectious diseases at once appear, in spite of the healthy mode of life. Infections borne by food and drink—for example, typhoid fever, have been practically stamped out. Breath borne infections, the bacteria of which live in some part of the respiratory tract, preferably the nose and throat, are yet to be conquered.

There are no vaccines for most of these diseases. The fundamental point in dealing with them, therefore, is to prevent them by avoiding overcrowding and by providing adequate ventilation. Recurring epidemics of cerebrospinal meningitis which took place last year at the barracks of one of the most celebrated regiments in England were controlled

by such measures. For example, the sleeping huts, which previously contained thirty beds, had ten beds taken out, so that the minimum distance between each bed was two and a half feet. In addition, half of the windows of each hut were opened at the top on a slant and nailed in this position and untouched, regardless of the weather.

As the men come to the camps well, the problem is to find at once the soldiers who are carriers of disease and isolate them before they can infect their mates. This was accomplished in a dramatic fashion at one cantonment recently by having twenty-four teams of medical officers meet the incoming troop trains and take cultures from the nose and throat of each recruit. The soldiers who were found to be carriers were at once isolated and treated. Work of this kind means that the bacteriologists in this war are an overworked set of men.

The problem of the carrier is the acute medical problem of the cantonments. It is becoming evident that the nose and throat are the abode of choice of the streptococcus and probably of the organisms responsible for many of the infectious diseases. The prophylaxis of infections of the respiratory organs is a most pressing problem in this country and abroad. Striking results in the control of infectious diseases have been obtained in at least one cantonment by the use of gauze masks, and in measles the use of the gauze mask has been made compulsory. Of this problem only the surface has been scratched. Never before, however, has such an opportunity been offered to solve it. If it can be solved it will be one of the great medical achievements of the war. The poisonous gas of the enemy can be seen. We take the elaborate masks which are used by the soldiers to protect themselves from it as a matter of course. The germ laden breath of the soldier cannot be seen, but it is even more deadly than the gas. It would cause a smile if every soldier on a transport was required to wear a gauze mask when below or between decks, or if a less novel measure was ordered—namely, that every soldier should carry a piece of gauze and be required to cough into it. Had either of these measures been a routine procedure on the transports this last winter, my feeling is that instead of men landing in France ill with acute or chronic pharyngitis, acute or chronic tonsillitis or acute or subacute bronchitis, which was the con-

dition of things all through the cold weather, the percentage of such diseases would have been markedly reduced. I feel strongly on this point, and I am certain that I am not making a mountain out of a mole hill.

In addition to the problem of the carrier at the base hospitals the following problems have come up for solution: The control and prevention of venereal diseases; the treatment of infectious diseases and of diseases of the respiratory tract; and the treatment of the surgical complications of these diseases, such as tonsillitis, mastoiditis and empyema. The otolaryngologist, the general medical men and the bacteriologists have been by far the busiest medical officers. Waves of infection have passed over some of the cantonments, and the streptococcus has had a field day.

Only supposedly well men are chosen for the army, because its sole purpose is to fight. The chief purpose of the medical corps, therefore, is to keep the soldier well. Unfortunately, it is not its only purpose, because well men get sick and fighting men must be injured. Naturally the most dramatic part of the medical officer's work in the army is caring for the wounded; the most important part, however, is keeping the fighting men well. Preventive medicine, therefore, is the medical problem of the army *par excellence*. Those who have the vision to engage in the solution of its problems have under their control in the army an unparalleled human laboratory and the opportunity of a century. I feel that physicians do not as yet realize this.

If practice makes perfect, the otolaryngologists in the army today should be experts in opening peritonsillar abscess, in resecting the septum, in tonsillectomy and in mastoidectomy. They can never hope, however, to catch up with the number of tonsils that are acting as foci of infection and thermostats for streptococci. The dentists can never hope to clean up all the teeth that are foci of infection, and the surgeons, operating as they do in some of the cantonments on ten to twenty cases of hernia a day, can never see the end of their task. It is my belief that the soldiers who are to compose our standing army which is to help maintain peace when it finally comes will never be allowed to take their place in the ranks unless

they have a normal nose and throat or have them made normal by operation.

I am much concerned at the present time about the scientific results of the medical work of the army. Naturally, of course, I am interested first and chiefly in my own specialty. My efforts must be largely confined to reminding the men in the hospitals that a great opportunity lies at their hand and urge them to grasp it. In a great measure it is a matter of keeping adequate records. One hesitates to add more paper work than is already necessary in the army. The initiative in this matter lies with the commanding officers of the base hospitals and the chiefs of the medical divisions. By means of the army records men can be traced for years to come. What better chance on a large scale has the medical profession ever had of settling the results of certain operative procedures—for example, tonsillectomy in chronic affections of the heart or of the joints—than is before it now? Practically every medical man serving in the army wants to go abroad. I have been in France twice during this war, but I can assure you that it is a great question in my mind whether there is not a fuller scientific opportunity in this country than overseas.

THE EQUIPMENT AT CANTONMENT BASE HOSPITALS—

PERSONAL NOTES.

The equipment at the cantonment hospitals is nearing completion. At the beginning of the war it was found that eighty per cent of the surgical instruments were of German make. The instrument firms of this country were at once lined up and asked for maximum output. For a time the men who were first at the hospitals had but little to work with except the instruments which they brought with them or had sent from their offices. Now it is only a question of asking for reasonable things and knowing how to ask for them and to have a vigorous commanding officer back up your request, and repeat it if necessary, in order to get all essential instruments. Naturally the whim of every operator for special instruments cannot be granted. It is still good policy, however, to carry your pet instruments. Then you operate at your ease from the start. If the instruments wear out, you can call this your

contribution to the cause in place of buying more Liberty Bonds.

Speaking of being first on the ground reminds me that in the beginning days some of the men did not see why they were required to be on the spot so early, why they were not left until things were further along. They were sent because their experience was needed to start things properly. In banks clerks are not made directors. Of course in many cases the men first on the ground were uncomfortable. In the beginning some murmured a bit; now they brag of it. I have yet to talk with one of the pioneers who would have missed these beginning days. In many cases they made the hospital what it is at present, even, like Day, taking part in the carpenter work. Where the men realized their job they saw to it that the head building was not pushed off the map, that it was not used for extra barracks, that it was well placed, that the original plan was even improved upon. Take Holmes, for instance: he was put in charge of all the building by the commanding officer, and the result is no surprise to those who know him. The rest of the hospital had steam for its operating room. As a matter of course Holmes soon had it for his building. He got not only steam but everything else that the army allows, and I suspect some things that were not allowed. In fact, he has one of the show places among the cantonment hospitals. He is an early bird if there ever was one, and always collects a large basket of worms wherever he goes. Pierce is happy at Grant, now that he can keep his shoes and his clothes clean. Eagleton, at Dix, is still in a delirium of enthusiasm. Knowles has a fine place at Devens, and Skillern has developed a taste for administrative work and has aspirations to become a commanding officer. He also is much interested in his band. He has promised to embarrass me by meeting me with it when I next go there. Harris has gone to Oglethorpe to take charge of the teaching of otolaryngology. His worries have begun and mine have finished. Berens, Greene, Emerson and Fetterolf are just coming into the service. Wherever they go, the Surgeon General's office can rest assured that things will run right. Levy got as far away as he could and is at Camp Lewis, American Lake, Washington. Wherever men of this stamp are placed there will be no more rumors of substandard work like

Wild's incision for mastoiditis, and no suspicion of over-operating.

Haskins went early to West Point and is now professor of military hygiene. Friedberg is at Doniphian and one of the men working under him says that being in the clinic there is better than any postgraduate course abroad.

Since the entrance of this country into the war, Ingals has died. He took great pride in acting for the Surgeon General's office as state adviser, looking up the standing of applicants and furnishing the Division of Otolaryngology with their rating. His figure comes back to me now as he stood last year by the dinner table after the banquet of the American Laryngological Association. He spoke about the war and said quietly but firmly, as was his custom, how he regretted that he could not take a more active part. He did his part, however, to the limit of his strength, after the habit of his life. He suffered greatly, but lack of patriotism in a friend or acquaintance hurt him more than the pain of one of the cruellest diseases.

THE PROBLEM OF THE SURGEON GENERAL'S OFFICE.

Naturally there have been many worrying problems for the Surgeon General's office to pass upon. Of these, otolaryngology has had its share with the other departments. The first was the problem of consultants. Three or four consultants were appointed, but the plan from the start worked poorly, and the medical officers who held such positions had to be given the choice of taking full time duty or going on the inactive list. Part time service is considered by the man who is giving full time as an unjust discrimination against him. He holds that all men have an equal right to it, and they have. Not only does it carry an unjust discrimination, but it destroys military uniformity and control. These, of course, are simply other names for discipline, and discipline is the backbone of the military machine.

The commanding officer of an army hospital naturally has pride in having a staff of medical men who can cope with all the cases that come to his hospital, however difficult. If he is not so fortunate in his personnel or if unusual cases occur,

he is at liberty to call in the most available civilian physicians. This has been necessary in at least one hospital and may be necessary again, unless more of the experienced otolaryngologists of the country enter the service. There will be, of course, some men who cannot enter the service on account of physical disability, age, or some other sufficient and good reason. Let these men, if they want to be of use, make themselves known as standing ready to help as civilians, but they should be careful not to embarrass the Government by trying to be both in uniform and out of it.

Service as contract surgeon has not been used in otolaryngology, although it has been employed in some of the other divisions. Pressure is being continually brought to have the government use the civilian hospitals as a part of the war machinery. If I should give my own opinion in this matter, it would be that if the war is to continue three or four years more I can see how this may become necessary. At the present time, however, it brings up the old question of divided control and part time service. The Surgeon General's office, therefore, does not favor it.

The problem of the medical student has met a happier solution. Procuring a medical education is considered by Washington as preparation for the medical corps of the army, and the medical student graduates by law into that corps. Those who are serving internships in hospitals have been allowed a year for such service. Naturally, however, many of the more ambitious and the most patriotic among our young men prefer to enter the army at once and let the army experience take the place of the internship.

As I look at it, it is axiomatic in a war of the magnitude of the present one that our hospitals are to be short handed, and that the medical schools must run on reduced personnel. Elaboration of courses must be eliminated for the time being and the schools come down to the three R's of medicine. Both hospitals and medical schools, however, can help themselves by doing away with the age limit and bringing back into service the men who have retired. There is at present a committee in the Surgeon General's office which has this most important matter of teaching in the medical schools in charge for adjustment. There is every disposition to look on both

sides of the question—England's mistake is well known. The Surgeon General's office has been fully reminded of it.

THE NEED FOR MEDICAL OFFICERS.

I am continually asked if there is still need for medical men in the service. Sixteen thousand are now serving, but an imperative call has gone out for five thousand more. In the general branches of the medical service physicians of large hospital experience are badly needed. From all the cantonments the cry comes, send us experienced men. Otolaryngology is better off than general medicine and surgery. However, when the base hospitals begin to go overseas in numbers there will not be enough experienced otolaryngologists to take their places. To make the department of otolaryngology what it ought to be there should be on file, ready for instant use, the names of two hundred otolaryngologists of ripe hospital experience. These men should be ready to send in their application papers on telegraphic notice. As fast as the proper openings occur they could then be fitted in. At present the available list is less than fifty. As things stand now, if your name was on such a list you might be used in six weeks or six months. However, by standing ready to apply for a commission you have put yourself at the disposal of the government and have fulfilled your duty, at least as I see it.

If you take the combined membership of the American Otolological Society, the American Laryngological Association, and the American Laryngological, Rhinological and Otological Society and omit the duplicate names and compute the percentage of the members who are in the service it is found to be about twenty-two per cent. There are five Lieutenant-Colonels—Kopetsky and Imperatori in the field ambulance; Haskin, professor of military hygiene at West Point, and Richardson and Mosher in the Surgeon General's office. There are forty-one Majors, twenty-six Captains and eight Lieutenants. The records also show that there are in active service two hundred and ten otolaryngologists and two hundred and thirty-two ophthalmologists. Unfortunately, I haven't the figures for the special sections of the American Medical Association. Owing to the large size of these sections, I imagine that the percentage would be somewhat less.

RETENTION IN A SPECIALTY.

In the beginning of the war the Surgeon General, with his large grasp of affairs, made the statement that specialists would be used in their specialty as far as the exigencies of the military service permitted. No absolute promise could be made and none was made. Naturally some men have tried to kill the goose which laid the golden egg by considering this statement a promise. This attitude has been especially true of the men just entering the specialty. No military organization could stand for a minute if so constructed. Full command is essential in order to meet changed conditions and emergencies. Up to lately the great majority of the specialists who came into the service have been used in their specialty. A few that have been found incompetent have been transferred to other lines of the medical service. I am aware also that a few men have escaped retention in their specialty, and these failures, I am aware also, will be talked about and made the most of to the end of the chapter. The fact remains, however, that never in any war before have the medical officers been fitted in according to their talents and special training as they have in this war; and this is all due to the recognition of modern medicine by the present Surgeon General.

Within the last month the shortage of medical officers has become so acute, the needs of the field service, without which the army from the medical standpoint could not exist a day, have become so pressing that all the medical men within the draft age, trained in a specialty or not, have been released to field service. This, of course, is essentially a young man's job and one that appeals to the right kind of a young man. This emergency has made it difficult now to retain in his specialty any man under forty. How long this shortage of men in the field service will last depends in a great measure on how the medical men of the country respond to the recent appeal. It was this scarcity of medical men which made the last call of the Council of National Defense necessary. War has always been an affair of young men, inconceivably sad, of course, but in a just cause, most glorious. This war, from a medical standpoint, has been an affair of older men.

It goes without saying that all physicians are not equally well trained; that all have not had the same hospital advan-

tages. As all the physicians did not enter the service at the start and at the same time, it follows that those who came in first will rank, for a time at least, those who came in last. You cannot make it fair any other way. The men who gave up a year ago—and what they gave up in many cases was all that they had—are not to be lightly pushed aside by those who took a year to arrange, bargain and decide. There is no game in civil life where such a thing would be called fair. Why should it be asked for in entering the medical corps of the army?

There are not enough men of operating experience to make the medical service in otolaryngology what it should be. Some of the best men I know are not in the service—best in one sense. These men are beginning to come in. In the year that has elapsed they have been able to keep their homes open and to be with their families; yet in spite of having delayed, and in spite of having enjoyed these advantages, some of them ask on entering the service that they supplant the men already in the field. Not even a German would call this fair.

I am often asked where are the young medical men, what is the matter with them that there are not enough to do the commonplace work that makes up so large a part of the army medical officer's day? If they were all the sons of physicians I should say that they took after some of their fathers.

THE CHARACTER OF THE MEDICAL WORK.

The opinion is often expressed that the highly trained physician is wasting his time in the army, that he would be doing more good staying at home attending to the civilian population. At times this view expresses an honest conviction; occasionally, alas, it is used to drug an awakening sense of duty. As I see it, there is an abundance of worthy opportunity for the man able to grasp it.

It is true, of course, that commonplace work predominates; that there is plenty of boy's work, as some have called it; that for the moment at certain places there is plenty of no work at all—to use an Hibernianism—plenty of just staying on the job waiting and prepared; which, by the way, is a new thing for us. It is true, to repeat, that there are plenty of all these nonpicturesque and nonstimulating things; yet those who are making up their decision to serve or not, if they let the ques-

tion rest here, miss the most vital point of all. In the last analysis, no one enters the service to do special medical work, to increase his scientific reputation or to gain one. The basic idea is to help win this war in the shortest time possible, or as the boys say, "to lick the Germans"; and nothing which contributes to this end, however tedious and commonplace it may be, is beneath my dignity, or saving your grace, beneath yours. It must be admitted that it is hard at times to hold true to this glorified view of the work, especially when you see the inequality of sacrifice made by men, even in the service, and when you learn that some of them are smugly adding to their substance, even in war time, and you know that yours is lessening—but hold true to it you must. It is your guiding star in this lonely job of measuring up to your duty in your allotted place. If you think differently and stay out of the service when you should serve, you must be prepared some day to tell your daughter—you will not need to tell her mother, for she will have it buried in her heart—that her girl chum's father, not you, kept the faith. It has made me heartsick and weary beyond words to sit at my desk in the Surgeon General's office and read and hear this and other threadbare excuses. As I look at it, after a year of trying to do my bit, those who make these excuses have lost their American heritage of red blood.

WASHINGTON, June, 1918.

XXV.

A CASE OF OTOGENOUS TEMPORAL ABSCESS
WITH HEMIPLEGIA, FACIAL PARALYSIS AND
APHASIA; CEREBRAL DRAINAGE, DECOM-
PRESSION, RECOVERY.*

BY OTTO GLOGAU, M. D.,

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Miss G. A. B., eighteen years of age, was referred to me on June 5, 1915, by Dr. L. W. Wittenberg.

When four years old, patient suffered from scarlet fever. Since that time the left ear was discharging at intervals. Four years ago foul odor was noticed, the hearing impaired gradually and the patient became recently very dizzy and suffered from intermittent headaches and loss of appetite. The patient, otherwise healthy in appearance, is physically somewhat depressed and shows a rather slow cerebration.

The left drum membrane is totally destroyed, the promontory covered by unhealthy granulations. From the attic protrudes a whitish, grayish mass which upon microscopic examination proves to be cholesteatoma. C¹ not perceived, C⁴ only a few seconds. Rinné negative. Weber to the diseased side, Schwabach considerably shortened. Whispered and conversation voice not heard. Warm water and rotatory nystagmus on the left ear are combined with severe dizziness and lasts thirty seconds. Temperature, 98 F.; pulse, 70. The mastoid bone, in the antrum region, is very tender to touch.

Diagnosis.—Chronic middle ear suppuration with involvement of the mastoid bone and possibly of the brain.

Radical mastoid operation was advised and performed by myself on June 10, 1915, at the Philanthropic Hospital. Almost the entire mastoid cavity was filled out by cholesteato-

*Presented before the Section on Otology, New York Academy of Medicine, April 12, 1918.

matous masses and necrotic granulation tissue. This pathologic process encroached also upon the tegmen tympani, which had to be removed, and the dura was exposed to the extent of one centimeter. It was found to be normal upon inspection and touch. The radical operation was performed in the regular way, with the exception that the posterior wound was left partially open for drainage, on account of the exposure of the dura.

The patient apparently made an uneventful recovery, was regularly dressed and was dismissed from the hospital June 25, 1915, two weeks after the operation.

The following day, while at home, the patient became chilly, dizzy and vomited. The next day she became convulsive on the right side of her body and soon afterwards paralyzed on the entire right side, including the face, and lost her speech.

The patient was found by myself in a condition of drowsiness. There was total motor and sensory aphasia, right sided hemiplegia and facial paralysis combined with hemianesthesia. Temperature, 96 F.; pulse, 48. The eye background showed bilateral optic neuritis, the pupils were unequal, the left one dilated and sluggishly reacting. Quite some photophobia was noticeable. The patient was very dizzy towards the affected side and there was marked sensitiveness upon percussion of the squama. Lumbar puncture showed a clear cerebrospinal fluid, with decreased lymphocytes and albumen. No microorganisms. The diagnosis of left sided temporo-sphenoidal abscess was made and immediate exploration of the brain advised.

The operation was performed on June 28th, at a sanatorium, Dr. Wittenberg assisting. The radical mastoid wound was reopened and the dura exposed further, starting from the tegmen tympani and antri upwards towards the squama. The bone covering the dura was removed by means of rongeur forceps, in a curved line around the meatus ext., to the extent of two centimeters. At the lower aspect in the region of the tegmen, the dura did not show any changes. Even in the region of the squama, after exposing quite a part of the dura, no discoloration was seen, nor was the dura at any part covered by exudate or granulations. According to Körner's observation, the brain abscess is near the place of aural

infection. Consequently, the dura was incised in the region of the tegmen and the abscess searched for by introducing the brain knife upward and inward three centimeters. No pus was struck. The same negative result was obtained when the knife was directed in an upward and anterior direction.

The dura was then exposed and incised in the squama region, about one and one-half centimeters above the upper canal wall, and the brain explored. When directed towards the superior temporal gyrus, inspissated cheesy material, together with brain sloughs, were evacuated. A forceps was introduced closed and opened within the abscess cavity to induce freer drainage. The cavity was then irrigated by means of warm physiologic salt solution and inspected by means of a long Killian speculum. The cavity was found to be rather large and surrounded by thick walls. Iodoform gauze, one-half inch wide, was then introduced by means of the speculum, and a slender forceps to the bottom of the cavity, and the latter loosely packed, the drain emerging from above the mastoid wound. The mastoid wound was partially closed and drained from below.

The patient the next day was in excellent mood, talkative, or at least tried to talk, for she could only mumble, and was very joyous. The dressing was changed first every day and then every second day. Immense quantities of decayed brain tissue were evacuating continually. An extensive hernia of brain tissue occurred. After the sloughing off of the hernia, the brain was retained in position by means of an aseptic paraffin net (surglets). The exposed brain portion gradually sloughed away and, with the use of scarlet ointment, became covered by epithelium.

The recovery of her speech occurred in a most interesting way. She had to be taught like a baby. Her understanding of the spoken word gradually improved, while the motor power to pronounce it showed only one year after the operation considerable progress. At the present time, three years after the operation, the patient talks almost normally, only the letter T and L being somewhat mispronounced. Under the influence of massage and electricity, she regained gradually the muscular power of the paralyzed right extremities and is now able to walk eight blocks on a stretch, to do housework and

make herself useful. The facial paralysis has entirely disappeared.

On October 4, 1918, Dr. Neustadaeter, upon neurologic examination, found the following condition:

Reflexes: Abdominal, patellar, achilles markedly exaggerated on the right side. The pupils were unequal and react sluggishly to the light but well to accommodation. There is some clonus in the right foot and Babinski phenomenon in the same foot is present, and also the Oppenheim reflex.

Motor disturbances: There is a spastic hemiplegia on the right side of the body with athetosis in the right hand. The tongue deviates to the right. Speech: Signs of previous motor and sensory (auditory) aphasia. Cranial nerve disturbances: Deafness in the left ear, double postneuritic atrophy, more marked in the left eye. Sensory disturbances: Right hemihyperesthesia and complete astereognosis in the right hand.

In conclusion, I wish to call attention to the following outstanding features of the case:

We have apparently to deal with a chronic temporal abscess caused by chronic middle ear suppuration with cholesteatoma. When the patient was first seen, the abscess was in the socalled latent stage. The subjective symptoms were: dizziness, headaches, lack of appetite, depression and slow cerebration.

At the radical operation the exposed dura was found to be normal. Over two weeks afterwards the manifest symptoms of the brain abscess became evident. These symptoms may be subdivided, according to von Bergmann, into general symptoms, general brain and brain pressure symptoms and local brain symptoms. At the second operation, the dura did not show pathologic changes, no fistula, granulation or exudate, pointing to an extension by contiguity from the middle ear process towards the deeper brain tissues. The abscess was located at the upper temporal convolution quite away from the middle ear focus. The infection therefore was an indirect one, either by means of the lymphatics, the sheaths of the arteries or the nerves or, according to Körner, by extension of thrombophlebitis in the pial vessels. The abscess was first attacked from the logical port of entrance, the tegmen tympani. When exploration from this point did not reveal pus the

dura was exposed higher up into the squama, with the intention of attacking the abscess from the squama region, and with the idea of having enough decompression to alleviate the pressure symptoms, in case the abscess could not be reached from the squama region.

Prolapse of brain tissue is no untoward complication. It may be easily overcome by appropriate measures.

The crossed convulsions, hemiplegia, hemianesthesia, facial paralysis, also the motor and sensory aphasia, are not caused by the extension of the abscess cavity to the respective foci within the cortex—due to pressure action upon the motor and sensory nerve fibers within the capsula interna, as Dencker assumes, but to the remote action of the increased intracranial pressure upon and of the inflammatory reaction around the cortical centers within the anterior posterior central and the inferior frontal gyri.

Exploration of the brain in the latent stage of brain abscess is only indicated when the dura, upon local inspection, shows suspicious changes. In the manifest stage, the brain must be explored, even in the presence of apparently normal condition of the exposed dura. The exploration logically has to start from the region of the tegmen tympani, and only in case of negative result a place remote from the aural focus.

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XXVI.

THE PATHOLOGY OF SINUS THROMBOSIS.

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Most thrombi are described as consisting of a head, a neck and a tail. The head is usually white in color, the neck is mixed white and red, and the tail is red. The tail usually forms the bulk of the thrombus. The head of the thrombus is composed almost entirely of blood platelets. Blood platelets are small disc-shaped nonnucleated bodies, which are normally present in the blood. According to J. H. Wright of Boston, they arise from the giant cells of the bone marrow and the spleen.

The free surface of the head portion of the thrombus is covered with ripple-like markings. A longitudinal section of this portion of the thrombus shows that these delicate surface elevations are the summits of a framework of beams. The beams are composed of blood platelets, and are surrounded by a border of polynuclear leucocytes. The spaces between the beams are filled with red blood cells. There is no fibrin. The nearer we approach the free extremity of the head portion of the thrombus, the broader the beams become, and the narrower the furrows between the beams, until finally at the tip of the head portion the beams unite into a solid white mass of blood platelets. The beams are transverse to the long axis of the vessel, or oblique. They grow outward from the vessel wall. In the neck portion of the thrombus the furrows containing red blood cells, which lie between the beams, become wider. The neck portion of the thrombus is mixed red and white, because of the admixture of red blood cells with the blood platelets. The tail portion of the thrombus is red and consists of an irregularly arranged mass of red blood cells, leucocytes, blood platelets and fibrin. It resembles postmortem clot, microscopically. The portion nearest the neck is the densest portion. Here, suggestions of lamellæ can still be seen. As we approach the end of the tail the structure of the

thrombus approaches, more and more, that of normal blood.

The head portion of the thrombus is formed first. This is laid down while the blood is flowing through the vessel. When the thrombus has grown sufficiently large to completely obstruct the lumen of the vessel, the blood column becomes stationary peripheral to the thrombus, up to the place where the first anastomosing branch enters the vessel. This column of blood becomes completely coagulated in a short while. This forms the tail of the thrombus. The neck is the intermediate portion between the head and the tail of the thrombus.

A white thrombus is formed by a sticking together of the blood platelets, and is called by Eberth and Schimmelbusch a "conglutination thrombus." A red thrombus is produced by ordinary clotting of the blood, and is called a "coagulation thrombus." A blood platelet thrombus can only occur in a flowing bloodstream, and a red thrombus can only occur in stagnant blood. Very long white thrombi occur when the blood continues to flow through the vessel for a long time after the onset of the thrombus formation.

One of the factors in the formation of a white thrombus is a slowing of the bloodstream and the formation of eddies. Aschoff reproduced structures similar to the beam formation in white thrombi by placing dams and weirs in the course of a flowing stream of water, in which were suspended particles of sawdust. As a result of the slowing of the current of water and the formation of whirlpools and eddies, the sawdust was deposited at the dams and weirs in the form of ripples and net-like elevations.

The slowing of the blood current in the vein allows the blood platelets to be deposited on the wall of the vein, in the form of ridges. Before complete cessation of the bloodstream the system of platelets is covered by a layer of leucocytes. This is due to the fact that when the bloodstream is slowed the white blood corpuscles, being of lighter specific gravity than the red, tend to travel at the margin of the bloodstream and thus are deposited on the beams of blood platelets. When the thrombus fills the lumen of the vessel, the formation of the primary thrombus stops, as no new blood platelets can be carried past.

A slowing of the blood current is favored in certain parts

of the venous system, where there is a widening or bending of the vein, or where there is pressure from a large column of blood, as in the leg when the body is upright. There is a slowing of the current when there is pressure on the vein from without. These factors play a more important part when there is a defect in the heart's action, leading to a general slowing of the bloodstream in the venous system.

In addition to slowing of the bloodstream there are three other factors which play an important rôle in the causation of thrombi. These are an increased agglutinability of the blood platelets, an increased coagulability of the blood plasma and changes in the vessel wall. That slowing of the blood current alone does not cause thrombus formation was proven by Baumgarten, who showed that a stationary column of blood in a doubly ligated vessel did not thrombose. In thrombosis of infective origin there is an inflammation in the vessel wall and destructive changes in the endothelial lining of the vessel. It is likely that the bacteria in the vessel wall set free toxins which pass through the intima into the blood. These toxins, as well as the juices set free by the destroyed endothelial cells, probably act upon the blood platelets in such a way as to increase their agglutinability. An increase in the coagulability of the blood is probably also brought about in this way.

Clotting en masse is called coagulation thrombosis. To produce a thrombus of this type, complete stoppage of the bloodstream and an increase of fibrin ferment in the blood are essential factors.

That destruction of the endothelial lining of a vessel is not the only factor necessary to produce a thrombus is shown by the fact that thrombosis is very rare in extensive atherosomatous disease of the aorta.

The thromboses which occur after operations are due, in part, to the slowing of the blood current which results from loss of blood at the operation, weakening of the heart action, general prostration and confinement to bed. Another important factor is the change produced in the blood platelets by the infection.

Eberth and Schimmelbusch produced thrombosis experimentally by injuring vessel walls and interfering with the circulation. By ligating a vessel for a while, the intima was torn,

After releasing the ligature and allowing the blood to flow through the vessel for a quarter of an hour, the vessel was incised and examined. It was found that all the prominent portions of the inner surface of the vessel were covered by adherent masses of blood platelets. After cauterization of a vessel with silver nitrate and destruction of portions of the intima, similar results were obtained.

In a punctured or incised wound of a vessel wall, in which the bleeding was allowed to stop of its own accord, the opening was found to be stopped up by a plug of blood platelets which protruded into the lumen of the vessel.

Jakowski found that by injecting bacteria into the circulation and at the same time producing a disturbance in the circulation or a slight traumatism in a vein in some other part of the body (for example, by ligation), a thrombus was produced at the point of ligation, in most cases.

Talke exposed vessels in cats, dogs and rabbits. Pure cultures of staphylococci were placed in contact with the vessel walls and the skin sutured over them. The neck or leg vessels were usually used. After nine to seventy-four hours, the animal was killed. The affected portion of the vessel was removed and examined. Forty-four vessels were experimented upon in thirteen animals. Thirteen arteries and thirty-one veins were used. The femoral and carotid arteries and the jugular and femoral veins were employed. In thirty-three cases thrombosis was found, and in eleven, none.

Bacteria were found in fifteen of the thrombi. In the remaining eighteen, numerous bacteria were present in the periadventitial tissue. In six of these latter cases the bacteria extended to the middle layers of the externa. In three, they extended to the outer layers of the media. In eight, they reached as far as the middle layers of the media, and in one case there were bacteria in the intima. The bacteria were present almost exclusively in the interlamellar clefts and lymph spaces, but not in the vasa vasorum. Very few bacteria were found free in the tissues. The progress of bacteria could be followed through the lymph spaces in the externa, media and intima, and finally into the thrombus. The bacteria were present mostly in the peripheral portions of the thrombi. The

youngest thrombi contained no bacteria. The older thrombi contained bacteria in most cases. These facts seem to show that the thrombus is formed before the bacteria reach the bloodstream. The thrombus may even be formed before there are any marked changes in the intima. The bacteria in the vessel wall produce changes in the tissue fluids. This changed tissue fluid and the bacterial toxins enter the circulation and cause the blood platelets to become more viscous and adhere to each other and to the vessel wall. Changes are also produced in the blood serum. In this way the thrombus is formed. The bacteria then enter the thrombus, either directly from the vessel wall or through the circulation.

Stenger exposed the sigmoid sinus in a dog, and placed over the sinus a tampon containing streptococci. The streptococci were obtained from a suppurating ear, and were made more virulent by passage through several animals and cultivation in very alkaline Aronson bouillon. No thrombus was formed in the sinus. In another dog he placed an infected tampon within the sinus. There was no thrombosis. In a third dog one-fourth cubic centimeter of a bouillon culture of streptococci was injected into the sinus. There was no thrombosis, and the heart blood was sterile three days later. In a fourth dog, the wall of the sinus was scarified with a scalpel before an infected tampon was applied. This dog died two days later. An abscess was found over the sinus, and there was an extensive thrombosis in the lateral and superior petrosal sinuses. A portion of the thrombus was broken down, and contained streptococci and staphylococci. A pure culture of streptococci was obtained from the heart blood.

Stenger drew the following conclusions from his experiments:

1. The greatest protection against infectious thrombosis is the vessel wall itself. Bacteria which pass through a healthy vessel wall are destroyed in the circulation. The nonmechanical thrombus is preceded by disease of the vessel wall and subsequent change in the blood.

2. Bacteria do not cause thrombosis by settling upon the intima; the thrombus is caused by inflammatory changes in the blood, which are indirectly caused by bacterial invasion.

3. Thrombosis occurs before bacteria enter the circulation.

The infection of the thrombus is secondary.

Haymann infected the superior longitudinal sinus in twenty dogs, and the lateral sinus in six monkeys. He placed a tampon soaked in a culture of streptococci or staphylococci in contact with the sinus wall, and left it in place for varying lengths of time. He reached the following conclusions:

1. Infectious sinus thrombosis is best produced experimentally by the application of an infected tampon to the outer wall of the sinus. The rubbing on of cultures, even after injury to the sinus wall, does not usually produce thrombosis.

2. Bacteria can reach the circulation without the intermediation of a thrombus.

3. Sinus thrombosis usually occurs as a parietal clot, which becomes obturating after a variable time. Rarely, the entire blood column may clot at once.

The length of time between the application of the infection to the outer sinus wall and the beginning of clot formation varies within wide limits. The time from the beginning of the formation of the parietal clot until it becomes obturating also varies considerably.

4. Thrombi may contain bacteria as soon as they are formed, or the bacteria may enter the thrombus secondarily. Bacteria usually enter the thrombus from without, but they may enter it from the circulation. The number of bacteria in a thrombus varies greatly. The ends are usually more benign, but this is not always so. Moderate numbers of bacteria are no bar to organization of the thrombus.

5. Thrombi may remain parietal and organize thus.

6. The growth of thrombi is usually centrally directed. Discontinuous thrombi may occur through the fact that thrombosed dural veins may enter into nonthrombosed areas of the sinus, and thus produce new thrombi.

7. There is a marked tendency to spontaneous healing of thrombi. The healing usually starts early.

8. From the macroscopic appearance of the sinus wall it is impossible to judge the contents of the sinus.

9. Aseptic compression or incision of the sinus produces no thrombosis.

10. Injection of bacteria into the circulation, with aseptic compression or incision of the sinus, produces thrombosis.

Most thrombi are infectious. But a few are not infectious. These latter are called marantic thrombi and are primary. They are located most commonly in the superior longitudinal sinus and occur usually in individuals who are in a very weakened condition. They occur most commonly in very young children and old people. They probably occur as the result of a slowing of the bloodstream and changes in the constitution of the blood. The thrombi are almost always mural and they never suppurate. They either organize or become absorbed. The thrombi may extend into the cerebral veins and produce localized cortical cerebral lesions.

Infectious sinus thrombosis is due either to compound fracture of the cranial bones or to a localized inflammatory lesion in some part of the head. Inflammatory processes in the scalp may cause a thrombosis of the superior longitudinal sinus. Inflammations on the face, in the orbit or about the tonsils may give rise to a thrombosis of the cavernous sinus. The most common cause of sinus thrombosis is suppurative disease in the middle ear and mastoid. This gives rise to thrombosis of the lateral sinus and jugular bulb. Several cases have been reported, of suppurative adenitis in the neck causing a thrombosis of the internal jugular vein, which extended up into the jugular bulb and sigmoid sinus. Injuries to the sigmoid sinus or jugular bulb in the course of a mastoid operation may give rise to a sinus thrombosis.

Thrombosis of the lateral sinus resulting from middle ear and mastoid disease may come about in one of several ways.

1. The inner table of the mastoid over the sinus may be diseased and an abscess form between the sinus and the inner table. This results in an inflammation of the outer sinus wall, which in turn leads to the formation of a thrombus within the sinus.

2. The inner table over the sinus may be diseased and cause an extension of the inflammatory process to the sinus wall without the intermediation of a perisinus abscess. The phlebitis results in a thrombus formation.

3. A thrombus may form in one of the smaller veins of the mastoid process and extend into the lateral sinus.

The pathologic changes in sinus thrombosis are the same as in thrombosis of veins in other parts of the body, with the

exceptions caused by differences in the structure of the sinus wall. Differences in location also give rise to variations in the pathologic changes. The sinuses differ from veins principally in the fact that they have no muscular coat, and that in most cases they are adherent to bone.

The inflammatory changes in the sinus wall consist of thickening of the entire sinus wall due to round celled infiltration, dilatation of the vasa vasorum, and necrosis of some of the cells, especially of the endothelial cells in the intima. There may be smaller and larger abscesses in the sinus wall. There are numerous bacteria in the sinus wall. The thrombus is adherent to the intima. The thrombus usually contains bacteria, but it may be sterile. It may be broken down in places. It may be partly or entirely organized. It may be broken down in parts and organized in other parts. The outer surface of the sinus may be covered with plastic exudate. There may be an abscess between the outer surface of the sinus and its bony covering. When this is the case the sinus wall is **enormously thickened and covered with shaggy granulations**. Sometimes the thrombus breaks down, and a portion of the outer sinus wall becomes necrotic and breaks down, with the result that the abscess within the sinus communicates through the fistula in the sinus wall with the perisinus abscess. In some of these cases the pus may find its way through the mastoid canal alongside of the emissary vein to the outer surface of the skull and cause a localized edematous swelling in this situation, or it may pass through the posterior condyloid foramen and give rise to a cellulitis in the deep tissues of the neck in the region of the posterior cervical triangle.

The inner or visceral wall of the sinus may undergo the same changes as the outer wall. When this occurs there is usually an extension of the inflammatory process to the pia, resulting in the formation of adhesions between the sinus wall, the pia and the surface of the brain. In some cases a diffuse leptomeningitis results. Sometimes the inflammatory process extends into the substance of the brain and gives rise to a brain abscess. This is especially common in the cerebellum.

The saccus endolymphaticus lies in the visceral wall of the sigmoid sinus. When a suppurative labyrinthitis results in a saccus empyema, the infection may spread from the sac-

cus in both directions, giving rise to a sinus thrombosis and a cerebellar abscess.

Sinus thrombosis may cause alterations in the brain tissue and meninges in other ways than by direct extension of the inflammatory process from the sinus wall. The thrombus may extend from the sinus into some of the pial and cerebral veins. Thrombosis of the cerebral veins may result in the occurrence of spots of hemorrhagic softening in the brain. Heilbronn reported a case of sinus thrombosis with general cerebral symptoms. Autopsy showed an extension of the clot from the lateral sinus into the vena magna Galeni and the small basal cerebral veins, with spots of hemorrhagic softening in both optic thalami. In another case of sinus thrombosis there were disturbances of speech. In this case he found multiple small lesions in the medulla. Extension of the thrombus into the pial veins may cause a serous meningitis or an edema of the brain. In a third case of sinus thrombosis described by Heilbronn, there was a sudden onset of aphasia and agraphia after several hours of coma. The next day the aphasia and agraphia disappeared. These symptoms were due to an extension of the clot from the lateral sinus to the large pial veins which surround the temporosphenoidal lobe and drain it. There were no localized lesions in the brain. The symptoms were caused by an edema of the temporosphenoidal lobe which disappeared as soon as a collateral circulation was established.

The inflammatory process which extends from the sinus to the meninges sometimes gives rise to an involvement of one or more of the cranial nerves. This is especially true of the third, fourth and sixth nerves. The nerves become inflamed as the result of a direct extension of the inflammatory process from the meninges. In thrombosis of the cavernous sinus the inflammatory process spreads directly from the thrombus to the nerves which lie in the wall of the cavernous sinus.

Inflammation of the optic nerve occurs with sinus thrombosis. When the thrombus is in the lateral sinus, the inflammation of the optic nerve is probably due to an extension of the meningitis. When the thrombus is in the cavernous sinus the changes in optic nerve may be due either to the accompanying meningitis or to edema resulting from obstruction to the

circulation.

Thrombi in the sinus may be partial or complete. The partial thrombus is called parietal or mural, and the complete thrombus is called obturating. There is no apparent reason why some thrombi should be parietal and others obturating. Most of the thrombi that come to operation are obturating. All thrombi begin as parietal thrombi, and some finally become obturating. Parietal thrombi are no doubt frequently overlooked at operation. Leutert believes that parietal thrombi occur more commonly with acute otitis and obturating thrombi with chronic otitis. But the experience of most otologists today is that either form of thrombus is apt to occur with equal frequency in acute and chronic otitis.

According to Brieger, "a parietal thrombus in the sinus can only be assumed, when it is demonstrated; but even in cases which are positive anatomically, the proof of the presence of a parietal thrombus must be completed by the further proof that the thrombus is so situated that it took its origin from the ear, and is so constituted that it can produce general sepsis and metastases." He believes, for example, that in cases of otitic general sepsis, in which autopsy shows a small partly organized parietal thrombus attached to the cerebellar wall of the sigmoid sinus, the thrombus is not the cause of the general sepsis. A thrombus of this kind is too insignificant and contains too few bacteria to keep up a general sepsis, and furthermore, a thrombus in this situation is usually not an extension from the middle ear suppuration, but is due to incision and tamponade of the sinus.

The thrombus is most commonly located in the sigmoid portion of the lateral sinus. It varies in size from a fraction of an inch to the entire length of the lateral sinus. It may extend down into the bulb, and even for a variable distance into the internal jugular vein. It may even occasionally reach the upper part of the innominate vein. It may extend upward as far as the torcular, and even cross over into the opposite lateral sinus. It may extend into the superior longitudinal sinus, the occipital, the straight, the superior or inferior petrosal sinuses. It may extend into the mastoid emissary or the posterior condyloid vein.

There may be a primary thrombosis in the jugular bulb,

without involvement of the sigmoid sinus. It is easy to understand how the inflammatory process may pass directly from the middle ear through its floor to the wall of the jugular bulb, especially when the floor of the middle ear is very thin or even wanting altogether. Leutert does not believe that primary bulb thrombosis occurs as the result of extension through the floor of the middle ear. He thinks that it is due to bacteria which enter the bloodstream through the wall of the sigmoid sinus, and passing downward, find a favorable spot for clot formation in the bulb. Here the bloodstream curves and forms a whirlpool. The lumen of the bulb is narrowed at its outlet. The blood current is forced back from the internal jugular vein during deep expiration.

Occasionally the thrombus is located in the inferior petrosal sinus, without involvement of the other sinuses. The veins of the internal ear empty into the inferior petrosal sinus, and suppurative disease in the labyrinth may give rise to a thrombosis of the inferior petrosal sinus. Necrotic processes of the petrous pyramid may also result in a thrombus formation in this location. Schwartz reported two cases, Jansen reported four cases and Beyer reported one case of primary thrombosis of the inferior petrosal sinus. The writer reported one case of thrombosis of the inferior petrosal sinus complicating a chronic suppurative labyrinthitis. In this case, the thrombus extended from the inferior petrosal sinus into the cavernous sinus.

The thrombus may be situated primarily in the cavernous sinus. This occurs as the result of an infectious process about the face, in the throat or in the orbit. A thrombus may extend into the cavernous from the lateral sinus through the superior or inferior petrosal sinus. A thrombus in the cavernous sinus is rarely limited to one side. It usually extends, in a few days, through the circular sinus to the opposite cavernous sinus.

A thrombus may occur in the superior longitudinal sinus as the result of an infectious process in the scalp or nose.

We sometimes find, in operations for jugular resection, that the internal jugular vein is empty and reduced to a thin cord. When this occurs it is sometimes very difficult to find the vein. It can easily be mistaken for a nerve or a piece of fascia. The

reason for collapse of the vein is not very clear. It is generally thought to occur when the thrombus extends down from the jugular bulb into the internal jugular vein past the point of entrance of the facial vein into the latter. But it is difficult to understand why the blood should not pass upward from the subclavian to the lower limit of the thrombus in such cases. It is probable that a periphlebitis and phlebitis of the internal jugular is the cause of the obliteration of the vein.

Kramm and Passow reported several cases of obliteration of the sigmoid sinus without thrombus formation at the site of the obliteration. In these cases a perisinus abscess compressed the sinus until the walls were in apposition. There was an inflammation of the outer wall of the sinus with a thickening of the wall. When the inflammation reached the intima, the latter became adherent to the opposite wall. There was no thrombus formation, because, at the time when the inflammation reached the intima, there was no longer any blood passing through the sinus.

The following are the possible end results of a thrombus in the sinus:

1. The patient dies of general sepsis before the clot breaks down.
2. The clot breaks down in the center, and the pus finally breaks through the outer wall of the sinus, so that the abscess within the sinus communicates with the perisinus abscess.
3. The pus within the sinus breaks through the visceral wall of the sinus and produces a cerebellar abscess or a meningitis.
4. The thrombus organizes and results in obliteration of the sinus.
5. Part or all of the thrombus becomes absorbed, resulting in recanalization of the sinus.

In sinus thrombosis, bacteria pass from the thrombus into the general circulation, where they can usually be demonstrated. The streptococcus hemolyticus and the streptococcus mucosus are the organisms most commonly found. Occasionally other organisms are found. The presence of bacteria in the blood is determined by blood cultures.

Leutert believes that every case of otitis that has a bacteri-

emia is due to sinus thrombosis. Libman believes that there is a bacteriemia at some time in all cases of sinus thrombosis except those that are aseptic from the beginning and remain so. Brieger reported a few cases of pyemia with metastatic abscesses originating from middle ear suppuration, in which postmortem examination showed no thrombus in the sinuses or jugular bulbs. He believes that, although it is possible for an otitic pyemia to occur without sinus thrombosis, yet these are the exception, and the vast majority of cases have a sinus thrombosis. Kobrak reported several cases of general sepsis with otitis, in which no thrombus was found in the sinuses. Haymann, in the course of his experimental work on thrombosis in dogs and monkeys, found bacteremia without sinus thrombosis in a few cases. There seems to be no doubt that cases of otogenic general infection do occur without sinus thrombosis, but they occur very rarely. As a general working rule, we may assume that otogenic general infections are due to sinus thrombosis.

There are several conditions besides sinus thrombosis in which bacteriemia occurs. These are meningitis, tonsillar infections, acute bacterial endocarditis, scarlet fever, typhoid fever, pneumonia and erysipelas.

In cases of sinus thrombosis, bacteria may not be found in the circulation at all times. Sometimes two or three cultures must be taken before bacteria are found. Libman found that bacteria are most apt to be found either during or immediately after a chill.

Multiplication of bacteria in the blood rarely occurs. Libman found that the circulation often becomes free of bacteria within a few hours after the thrombus is removed from the sinus and the internal jugular vein ligated.

When fragments of infected clot are broken off from a thrombus in the sinus and carried into the circulation, they are caught in the pulmonary capillaries and produce metastatic foci in the lungs. When there are free bacteria in the circulation, they can pass through the capillaries of the lung and enter the systemic circulation. Under these circumstances they are more apt to produce metastatic foci in the joints, muscles and subcutaneous tissues.

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XXVII.

INDICATIONS FOR VARIATIONS IN TECHNIC IN
TONSILLECTOMY OPERATION.*

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By way of introduction, permit me to quote from a paper presented by the late Dr. J. R. Fletcher:¹

"When we can agree upon a technic which completely removes the tonsil in its capsule, does not open the aponeurosis of the superior constrictor muscle, does not injure the aponeurosis of the palatoglossus or palatopharyngeus muscles, which conserves every bit of the membrane reflected over the tonsil, which prevents fusion of the three muscles named and leaves a linear scar in a rudimentary fossa, which does not injure the voice and lessens greatly the frequency of the secondary hemorrhage, we will have achieved the ideal, in the light of our present knowledge."

He states, "that it is not a dream but it is being done uniformly by many." However, I fear that when all tonsil operators have agreed upon one technic, the millennium will have arrived. I base this conclusion upon the fact that all tonsils are not alike as regards shape, size, or histologic condition; nor are they situated alike in all throats with regard to other adjacent structures.

I can heartily agree that the ideal result would necessarily have to comply with the above stated conditions; but I do not believe that one technic is applicable to all types of tonsils. Furthermore, it would be a waste of time and effort to use an elaborate technic for a very simple case.

Dr. Greenfield Sluder² states, "that his instrument gives 99.6 per cent perfect results and that the late Dr. Ballenger stated that his modification of the Sluder instrument was good for 70 per cent of all cases." But what is true of these two men and a few others, who declare that their methods pro-

*Read before the Chicago Laryngological and Otological Society, February 19, 1918.

duce almost perfect results, does not prove, to me at any rate, that the great majority of tonsil operators can apply one instrument or one technic to all tonsillectomies. And for the purpose of presenting to you the conclusions I have reached from my own experience in tonsil surgery, I have made a classification of the different types of tonsils with regard to their anatomic and pathologic relationship to the adjacent structures in the pharynx. This is done for the purpose of practical and definite discussion of the subject and is not an attempt at originality. It is as follows:

- (a) The free tonsil.
- (b) Tonsils with firm lymphoid connection to tongue.
- (c) Tonsils with large upper lobe hidden in supratonsillar space.
- (d) The submerged tonsil.

(a) The free tonsil apparently has not a definite attachment to the tongue and slight, if any, attachment to the pillars. There is a well defined fossa between it and the pillars, and it protrudes out into the throat, from its pedicle-like attachment to the constrictor, an unhindered free mass of tissue. The pedicle varies in size and may be much smaller than the body of the tonsil. The supratonsillar space is free and there are no occluded crypts.

Quoting Dr. Boot:³ "It can be removed by any method with perfect satisfaction and is the kind that leads the occasional operator to think that he is capable of doing tonsillectomy." Because the pedicle is usually small and the tonsil itself is free, the above statement is undoubtedly correct. Almost any technic will serve in gaining a good result, provided that it is skillfully performed by a competent and experienced operator. There should be no damage to the adjacent structures. Usually the general practitioner, thinking the operation a minor one and not demanding special ability or experience, removes them himself. I have seen some very poor results due, I judge, to the lack of the very talents that he thinks unnecessary to successfully perform the operation.

A few years ago these were about the only tonsils removed, and usually the operator removed them because they were obstructing the oropharynx to such an extent that the patient demanded that it be done. Then he used a guillotine or a

McKenzie tonsillotome, placed the fanestra over the tonsil, shut his eyes and squeezed. It made very little difference to him whether he removed part or all of the tonsil or damaged the pillars or cut off the uvula. Unfortunately for the public, this method is still being used by some operators.

The Sluder instrument is now used by a great many men with very satisfactory results. In competent hands it is safe. Nevertheless, it has its shortcomings, and these are soon discovered after using it for a while. Makuen⁴ states that an ideal intracapsular tonsillectomy can be done with this instrument if used in conjunction with a snare. He grasps the tonsil with the instrument, using a dull blade and the Sluder dislocating technic, but makes no effort to crush its attachment. Instead he slips a snare wire around the tonsil and between the pillars and the instrument with which he squeezes out the tonsil. In deciding on this method of technic, I believe that he has definitely pointed out the particular weakness of the instrument.

Of all the instruments now used for this type of tonsil I believe the snare is the best, safest and most practical. Any snare will do, but the one that will place the wire snugly around the base of the tonsil and very slowly crush the attachment is certainly the one to use. My preference is the Beck instrument.

The free tonsil is not one which it is necessary to remove by dissection. When its removal is so easily and completely performed with one instrument, it surely is a waste of time and effort to operate by the former method. A deplorable result frequently happens when unskilled and inexperienced men attempt to apply a complicated technic to these cases.

(b) In this type the tonsil is attached to the tongue by a lymphoid tissue connection. It has been my experience, and I find the experience of other men, that if the tonsil and this lymphoid connection are not sheared off close to the base of the tongue you have what is apparently a return of the tonsil. What really happens, however, is that the lymphoid tissue proliferates and pushes up into the evacuated fossa, filling it with a lymphoid mass. I have had a case in which it was necessary to remove this lymphoid mass twice after a tonsillectomy. And other cases have occurred where it was neces-

sary for me to remove this mass once. This followed tonsillectomies where I used a Sluder or snare leaving a small pedicle of tissue in the infratonsillar space. So finally I decided that these cases could not be operated satisfactorily with one instrument.

I think that in these cases the tonsil should be carefully removed by dissection. No other method will do as well, because none of them will deliver the tonsil in toto. The method used by Dr. Justus Matthews comes nearer my ideal of a perfect tonsillectomy than any other, unless it be the methods used by Beck, Ballenger or Fletcher. The general idea of dissecting from the upper pole down to the tongue, where the snare is used to crush off this connection, is common with all four men. They differ only in their methods of dissection. This really makes little difference, if skillfully performed, whether it is sharp, dull or finger dissection. The ideal result is the removal of all the tonsil and lymphoid tissue up to the tongue without removing any of the pillars or adjacent tissues.

In my operations I use the following technic: Grasp the tonsil with the Ballenger fixation forceps and pull it out and down. Make an incision between the tonsil and upper part of the anterior pillar about an inch in length so that it is possible to introduce the index finger. It is now easy to free the upper part of the tonsil from the pillars and all of it from the fossa. Where the pillars still adhere to the tonsil they are gently separated, if this is thought necessary, and the operation finished with the snare.

(c) One may be easily deceived regarding the size of the third type, because of the fact that its mass is hidden up between the pillars in the supratonsillar space. This lobe may constitute as much as one-half of the entire tonsil mass and only during inflammation show any evidence of its presence. In many throats the meeting of the pillars is as low as the middle of the tonsil. The plica tonsillaris may assist the pillars in encysting the upper and anterior parts of the tonsil; covering the crypts and mucous glands, damming the drainage of the supratonsillar fossa and the space between the anterior pillar and the fossa. Very often its attachment to the tonsil is so intimate and firm that it seems to be part of it, and it is

difficult to distinguish just where the anterior pillar ends and the plica commences.

As a rule these are the cases that are prone to tonsillar abscess. However, you may find encysted pockets of pus giving no local evidence of their existence but causing pathologic conditions in distant parts of the body. G. E. Shambaugh⁵ states "that it is also a very frequent experience to discover distinct evidence of chronic infection in tonsils; as, for example, the presence of pus which can be expressed from the tonsil, where there has been no history of acute attacks, of acute tonsillectomy or of sore throat."

Even when gargling, these tonsils do not show their true size, and it is only when they are grasped with a tenaculum and pulled out and down that the outline of the upper pole shows through the anterior pillar. Only then are you able to gain a definite idea of their size and location. It is the rule to find the crypts filled full of foul smelling, cheesy material.

Regarding their removal, I will venture my opinion that this also is not a one instrument operation. The hidden upper pole must be dissected from its attachment very carefully. In fact, whether it is removed by sharp or dull instruments or by finger method, it requires the best of surgical skill to do this work properly. Many a blunderer may get away with an amputation, or even a laparotomy, but it takes real surgical ability to remove this tonsil without damage to other parts of the throat.

(d) The submerged tonsil, as the term would imply, is buried in the tonsillar fossa, with only a small part of its surface exposed. This renders it very difficult to determine its true size. The crypts, mucous glands and the fossa anterior, superior and posterior, cannot drain freely, if at all. The result is that peritonsillar abscesses are frequent, as this condition is ideal for encapsulation of detritus with resulting infection and pus formation. As a focus for infection this tonsil has as a competitor only the "hidden upper lobe" type.

Allow me to state that no tonsil of this type is ever needlessly taken out, and even if no encysted pus or infected detritus is found, which is extremely rare, it will not be long until this condition will obtain. Any way, you will have removed only a bit of lymphoid tissue that sooner or later

will cause the patient trouble, and which, up to date, has not been proven definitely to have any function, either as a bactericidal agent, internal secretory organ or pulley for the pillars to glide over while performing their part of vocalization.

It can be taken out very nicely in one of the three ways: Dissection, Sluder method or with the Beck instrument. The Sluder method works very well in selected cases, although there is always the danger of removing parts of the anterior pillar or at least some of the mucous membrane covering it. I have used the instrument in a great many cases with good results, but I must admit that I injured the pillars in several of my earlier Sluder tonsillectomies. The edge of the blade is difficult to keep in the proper condition. If too sharp, you may injure the pillars; if too dull, you may be forced to lay aside the instrument and do a dissection. And I have found that when the opening in the instrument is not smaller than the tonsil you may get only part of the mass, necessitating the removal of the balance by some other method. This is no doubt due to bad technic as well as an unsuitable instrument, but I have seen this happen to the best operators.

It is especially important that the blade be just the proper sharpness and to be sure that you have engaged nothing but the tonsil when operating on children, as their tissues are extremely soft and pliable. Otherwise you may do irreparable damage.

I believe that the Beck snare is the best instrument for tonsillectomies of this type in all cases where a one instrument method is warranted. It has all the good qualities of the Sluder and none of its faults. The No. 8 snare wire, which is usually used, is neither too sharp nor too dull. It has that much desired quality of dissecting its way between the tonsillar capsule and the aponeurosis of the muscular tissue. Like electricity, it seeks the easiest way. And when the loop is slowly and carefully tightened there need be no fear that anything besides tonsil tissue will be removed.

One great advantage of the instrument is in being able to lock it after the tonsil is engaged for the purpose of investigating just how much tonsil and other tissues you have caught in it. Then you are able, by slowly turning the screw, to get the utmost of the dissecting ability from the snare wire as

well as a minimum of hemorrhage.

About twenty-five per cent of this type are so situated that it is next to impossible to get them out with either of the above mentioned instruments, and one is forced to dissection. The tonsil in these cases is long and broad, comparatively flat and with very little of the mass exposed. It is so securely bound down by the pillars and the plica that it is difficult to engage even with a tenaculum. So it is necessary in these cases to use the greatest possible care, as injuries to the adjacent structure can happen to the most skillful operator. Therefore rapid fire work should not be attempted and patience should be substituted for speed.

In conclusion, allow me to say that no one would welcome a one instrument operation for all types of tonsils more than myself, if it were possible. But I do not think it is. Each case has its own anatomic and pathologic peculiarities that make it necessary for different methods and different instruments to be used. These varying conditions found demand deliberative study, the selection of a rational method for each case, and perfect technic to gain a satisfactory result. That is what the patients are paying for, will expect to get, and is what they should have.

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Citizens' National Bank Building.

XXVIII.

REACTIONS OF THE NORMAL LABYRINTH: RECENT EXPERIENCE IN THE UNITED STATES AVIATION EXAMINATIONS.*

By HILL HASTINGS, M. D.,
LOS ANGELES.

There has never been any accepted routine for making a functional examination of the activity of the vestibular nerve. Otologists, as a rule, have developed individual schemes of testing the canal reactions in accordance with the investigations of Bárány. In examining the candidates for the United States Aviation Service a plan of procedure for testing the vestibular reactions was originated by Major Isaac Jones, United States Army, acting under Colonel Lyster, and this procedure has been carried out in a definite way at all the United States aviation examination stations. After this work is finished it is possible that a definite routine for examination of the vestibular nerve will be established that will be followed by otologists in their private practice.

The opportunity to test out in aviation work a large number of normal men gives to us who are engaged in otologic work great assistance in determining **how much to depend** upon abnormal reactions in patients who are sent to us with suspicion of labyrinthine or retrolabyrinthine disease. One is certainly impressed by the regularity in the normal reaction responses to these tests in normal men. But, as in so many other things, no test or series of tests is infallible. Later in this paper I will speak of a few cases where abnormal reactions were found in men who were apparently normal—that is, perfect hearing was found and perfect general condition existed; yet the vestibular reactions, as found by douching as well as by turning, were abnormal.

Normal Vestibular Reactions.—It is not my intention to

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take your time in reviewing these reactions, for the reason that they are well known to you. I wish to go over the tests as standardized by the United States Army Aviation Service. This service has a routine that is carried out at all the stations throughout the United States. A standard revolving chair with a foot-stop pedal is used—the Bárány chair, improved by Jones. A stop-watch is used to accurately time the reaction. The applicant is seated in front of a window with no objects in the foreground, so that distant vision is secured. The steps of the tests are as follows: (1) Spontaneous nystagmus is looked for, with eyes forward, with eyes deviated to the right, with eyes deviated to the left. (2) The after-nystagmus is timed (by stop-watch) after revolving ten times in twenty seconds to right and again after revolving to left. The head should be upright with the imaginary line joining the external auditory meatus, and the external canthus of the eye parallel to the floor. The amplitude of the nystagmus is noted. (3) Spontaneous past-pointing with each arm is tested, with eyes closed. (4) The applicant is then turned ten times in ten seconds to the right and the past-pointing with each arm is tested. The same is done after turning to the left. (5) The falling reaction is tested by revolving the applicant five times in ten seconds, with the head forward on the knees during the turning, the reaction by falling being seen when the applicant sits upright. If any abnormal reactions are found the vestibular reactions from douching with water 68 degrees are excited, in one ear and then in the other, as follows:

Right ear syringed with head upright (the line joining the external auditory meatus and external canthus of eye must be parallel to the floor). (1) The length of time to the onset of nystagmus is reported. (2) The past-pointing with each arm (eyes closed) is at once tested. The head is then turned backward 90 degrees. (4) The nystagmus is seen to change from rotary to horizontal in character. (5) The past-pointing with each arm is taken with the head in this position. (6) The patient is then asked to stand upright with the eyes closed and the falling reaction noted. The left ear is then syringed and the same steps just given are repeated.

In testing over 800 applicants at our station we have made some observations which may be worth reporting to you. It

should be said at the beginning that all these vestibular reactions, supposedly normal, did occur in such an overwhelmingly large percentage that there seems to be no doubt whatever of the value of this definite scheme of carrying out the Bárány series of tests.

(1) As to spontaneous nystagmus it was not once found. (2) As to after-nystagmus from turning, we found that the average duration in 282 applicants was 23.49 seconds after right rotation and 24.17 seconds after left rotation—15 to 35 being the extremes in about 99 per cent of the applicants examined. Ruttin quotes Leidler's case report of complete absence of rotation after nystagmus without explainable cause. No such case occurred in over 800 normal men examined at our aviation examination station. One can only doubt that Leidler's case was a normal one.

More important than the duration of after-nystagmus is the point of the difference in seconds in after-nystagmus from right turning and left turning, because in diseased cases the rotation test is chiefly valuable because of the difference in after-nystagmus as shown on right rotation and left rotation. To show this point, the examinations of the first 200 applicants were considered. It is interesting to see that the average difference in seconds in after-nystagmus from right rotation and left rotation was $2\frac{1}{8}$ seconds. In only two of the 200 cases was there a difference of 10 seconds, and in no case more than 10 seconds between the right and left rotation after-nystagmus. In one of these cases the result was 20 seconds and 30 seconds, and in the second case the result was 25 seconds and 30 seconds' duration of after-nystagmus from right to left rotation. Such results in cases suspected of diseased conditions would hardly make one suspicious, because the duration of after-nystagmus is entirely too great to make one suspect an inactive canal or nerve on either side. These two cases were the only two where there was much difference in after-nystagmus from right to left turning. For example: In only eleven of the 200 cases was there a difference of over 5 seconds. If more than 10 seconds' difference occurred one should be suspicious and resort to the caloric test. So that it seems reasonable to conclude that this test, if applied exactly as required by the Army Aviation Service (10 times in 20

seconds), will rarely show a difference of over 10 seconds in right and left rotation after-nystagmus.

Some points should be emphasized in this test. The patient should hold his head in the correct position as given above, so that the horizontal canal is really horizontal to the floor. He should be turned exactly ten times in twenty second. While we think we learn to know the exact speed required without timing with the watch, we are apt to make an error unless we use a watch, and especially a stop-watch. We found that the best plan is to start the stop-watch on beginning to turn, and after turning ten times, note whether the second hand is at 19, 20 or 21, and time the after-nystagmus from that point. This enables one to be sure of turning ten times in twenty seconds, even to note after five turns whether you are turning too fast or too slow, and one can get the exact time of after-nystagmus by subtracting the 19, 20 or 21 from the number of seconds recorded when watch is stopped at the end of nystagmus reaction.

Spontaneous past-pointing was not found. Tendency to past-pointing was often seen to be due to a tight fitting coat (which should be removed) or to a large muscular chest, which, of course, makes one tend to point a bit to the right with the right arm and to the left with the left arm. The one to be tested should be shown just how the pointing test is to be done by the examiner going through the test. This will save much time and much confusion, and often prevents having to repeat the test. The arm should be kept extended, raised not too quickly to a vertical from the shoulder, and slowly but steadily and without muscular tension come down to touch the examiner's finger with his forefinger. He should be cautioned not to go too fast, nor to stop where he thinks he should, but continue letting the arm "drift down," even if he misses the finger of the examiner. It is often the last of the "drifting down" when the past-pointing will be most marked. Finally he should be told to remember to keep his eyes tightly shut until told to open them. The examiner on his part should hold his right hand, with the index finger extended, supported by the left hand, both elbows against his hips to keep a steady position; otherwise he will involuntarily

move a bit, especially if he is watching the down stroke of the one being tested.

(4) Past-Pointing After Turning.—The above precautions against error are to be noted. The army requires turning ten times in ten seconds, which for a man of medium weight, is about as fast as one can turn. It was not infrequent to find at this rate that such loss of equilibrium occurred that the applicant's arm, especially his left one, would be brought down without any muscular control, and so fast that it might past-point or cross-point badly on the first stroke. An unnecessarily abrupt stop would produce by its shock a similar extreme loss of equilibrium, rendering the test uncertain. A repetition often a bit more slowly or without the extreme shock of the stop on the tenth turn would often cause the usual normal response. Nevertheless, a stop device to lock the chair is an absolute necessity, and no past-pointing is accurate or consistent when a revolving chair without the locking pedal is used. The past-pointing reaction was elicited according to rule in about 90 per cent of those examined. The average number of times of past-pointing in 283 cases was as follows: Right arm, 2.22; left arm, 1.91 (after right turning); and right arm, 2.18; left arm, 1.96 (after left turning). One good past-pointing movement, however, is sufficient to indicate the reaction. Of 700 applicants 47 cross-pointed with one or both arms on turning for past-pointing, as follows: On right turning, 5 crossed with right arm, 26 with left arm. On left turning 18 crossed with right arm, 21 with left arm. The right arm crossed 23 times to 47 with left arm. This seems to us to be explained in this way: There is in right handed men a better control over the right than left arm, and during the loss of equilibrium that is extreme in a certain proportion of those turned, there was a greater loss of control over the left than the right arm. The fact that only 5 of the 47 cross-pointed with the right arm on right turning is to be explained, we think, in this way: that for the right arm to cross-point on right turning (that is, to cross the chest to the left), there is interference because of the large muscular development of the chest in right handed men. The following conclusions seem warranted: (a) In turning for past-pointing we must allow in some individuals or the extreme loss of

equilibrium that results, in which case the cross-pointing is not an evidence of disease but possibly a hypersensitive condition of the end organ in the labyrinth. (b) In all cross-pointing we should remember that the left arm is more apt to cross-point than the right arm, especially on right turning.

(5) The Falling Reaction.—This, too, should be explained by the examiner by a demonstration and the following points emphasized: (a) The applicant must be warned not to open his eyes until told to do so; (b) To sit upright without strain when told to do so; (c) to avoid any muscular control resisting the tendency to fall. The falling reaction was found to be abnormal only 11 times in 257 times on right turning, and 10 times in 259 times on left turning. Many times where the reaction obtained was abnormal it was found on retesting that the applicant was resisting the induced tendency to fall.

In conclusion permit me to cite a few of the relatively small number of cases where abnormal reactions occurred both from turning and from douching. These are interesting because the applicants were young, apparently healthy young men with normal hearing. The hearing tests (watch or whisper) demanded by the United States Army Aviation Service are inadequate, so far as ruling out unilateral nerve deafness. The writer for his own purpose therefore made tuning fork tests of applicants who showed any reduction in hearing to watch or whisper, as well as many applicants with apparently normal hearing. This tuning fork test as practiced was as follows: The applicant was tested in a quiet room, apart from others. The C₂ 512 d. v. fork was selected for routine use. Bone conduction and air conduction was each taken by a stop-watch and recorded thus: A. C. (normal or + or — blank sec.) exceeds B. C. (normal or + or — 1 blank sec.) by blank seconds. By this test I wished to determine, for my own satisfaction, in a series of cases what was normal bone and air conduction for this fork as well as the Rinné in seconds. I believe that this test fairly well proved that there was no nerve deafness in the cases where abnormal labyrinthine reactions occurred.

CASES WITH ABNORMAL REACTIONS.

No. 9. Vestibular reactions, as follows: Nystagmus after right turning, 21 seconds; after left turning, 21 seconds. Past-

pointing: After right turning, touches with right arm, past-points three times with left arm; after left turning, past-points two times with right arm; two times with left arm. Falling reaction normal after right turning; normal after left turning. On account of failure to past-point with the right arm after right turning, this applicant was douched, with the following result: Right ear, water 68 degrees, nystagmus, rotary, appears after one minute and nine seconds; past-points with each arm normally. Head bent backward 90 degrees, nystagmus changes to horizontal; past-points normally with each arm; when stood erect, falls normally. Left ear douched in the same manner, reaction appeared in one minute and four seconds and all responses normal. As the douch test for each ear produced normal reactions, this applicant was passed.

No. 14. Vestibular reactions, nystagmus after right turning, 25 seconds; after left turning, 24 seconds. Past-pointing, after right turning, one time with right arm, cross-pointed with left arm; after left turning, touched with right arm, touched with left arm. Falling reaction after right turning, none; after left turning, normal. This applicant was douched with absolutely normal responses from each ear, and accordingly was passed.

No. 15. Vestibular reactions from rotation were all normal, except that the after-nystagmus was of short duration, ten seconds after right turning and thirteen after left turning and of small amplitude. He was therefore douched with the following results: Right ear, 68 degrees, rotary nystagmus appeared after three minutes (feeble response); no past-pointing with right arm, fair past-pointing with left arm. On bending head 90 degrees backward, the rotary nystagmus changed to horizontal, but no past-pointing with right arm, fair past-pointing with left. Falling reaction subnormal. Left ear, douched, no response after six minutes with water at 68 degrees. Past-pointing with right arm, but not with left arm. Head then bent backward 90 degrees, whereupon horizontal nystagmus appears and past-points with right arm but not with left arm. Falling reaction, subnormal. Hearing test, normal. Result: rejected for flying, recommended for balloonist.

No. 16. Vestibular reactions, as follows: Nystagmus, after

right turning, 40 seconds; after left turning, 40 seconds. Amplitude of each is large. Past-pointing, after right turning, five times with right arm, five times with left arm. After left turning, cross-pointing with right arm, cross-pointing with left arm. Falling reaction, normal after right and after left turning, with nausea. Recommended for balloonist because of hypersensitive condition.

No. 100. Vestibular reactions, nystagmus, after right turning, 25 seconds; after left turning, 29 seconds. Past-pointing, after right turning, right arm, three times; left arm cross-pointing; after left turning, right arm, two times; left arm, two times. Falling reaction, after right turning, subnormal; rotary, after douching 38 seconds (water 68 degrees), past-after left turning, normal. Douched: Right ear, nystagmus, pointing with right arm normally, but no past-pointing with left arm. With the head back 90 degrees, nystagmus, horizontal, but no past-pointing with either arm. Falling reaction, subnormal. Left ear (douched), nystagmus after 42 seconds, past-pointing with right arm and with left arm. With head back, nystagmus, horizontal; past-pointing with each arm normally. Falling reaction normal; no nausea. This candidate was rejected because of the above abnormal reactions.

No. 112. Vestibular reactions, nystagmus, after right turning, 17 seconds; after left turning, 20 seconds. Past-pointing, after right turning, right arm, two; left arm, two. After left turning, right arm, three; left arm, cross-points. Falling to right, normal; to left, normal.

Douched: Right ear, no response after three minutes thirty seconds. No past-pointing with either arm. Head back (90 degrees), nystagmus horizontal appears. No past-pointing with either arm. Falling, normal. Left ear, rotary nystagmus faint after one minute thirty seconds. Past-pointing, none with right arm; yes, with left arm. Head back, horizontal nystagmus; no past-pointing with right arm, faint with left arm. No falling reactions. Middle ear normal. Hearing normal to watch and whisper, and normal bone and air conduction with C₂ fork. Result: recommended for balloonist, not for flying.

It is useless to detail other cases with abnormal reactions. The above gives a fair idea of the abnormal cases. It is not

my purpose to attempt to explain these abnormal reactions. On the contrary, they are so inexplicable by our knowledge of what reactions do occur in diseased cases that one is justified in believing that they could not possibly mislead one into incorrect diagnosis.

XXIX.

THE REPORT OF A CASE OF NEURITIS OF THE
EIGHTH NERVE INVOLVING BOTH BRANCHES
FROM A FOCAL INFECTION IN THE
APPENDIX.

BY GEO. W. MACKENZIE, M. D.,
PHILADELPHIA.

So far as the salient symptoms—i. e., vertigo, equilibrium disturbances and impairment of hearing are concerned, the case I am about to report is no different from many others the otologist meets with in private or hospital practice. Generally speaking, the symptoms and findings of eighth nerve neuritis, both as to the location of the lesion and the degree of involvement, are sufficiently characteristic as to permit of a ready diagnosis by the otologist who makes free use of up-to-date methods. When it comes to determining the particular etiologic factor behind the neuritis, however, the problem is not so easy. There is no problem in medicine more intricate and interesting than the study of the etiology of neuritis, for the nerves can become inflamed from a greater number of causes than any of the other tissues of the body; besides, the greater susceptibility of the eighth nerve over that of the other cranial nerves tends to enlarge still more the number of possible factors that can be responsible for inflammation of this particular nerve. Fortunately for us, the vast majority of bilateral cases are due to syphilis in one of its stages, and antisyphilitic treatment, if early begun, leads to most excellent results. The contrary holds true in the unilateral cases. It is in the unilateral cases that we find our greatest difficulty, not in locating the lesion or determining the intensity of the neuritis, but in ascertaining the cause or causes behind it, and unless this is known, the treatment must be more or less hit or miss and unsatisfactory.

The case, H. G. G., male, English by birth, age forty-nine years, occupation lumberjack for a number of years in Cana-

da, but recently retired. He was referred by Dr. W. D. Fellows, of Philadelphia, June 19, 1916. Previous to his present illness the patient had experienced the best of health. History of present illness: The patient complains of having suffered from vertigo and nausea off and on for the last eight years. During the last year and a half he has been comparatively free, but recently the vertigo has been quite pronounced, having as many as two severe attacks in a day. These attacks last from two to three hours, and with them there is marked nausea and vomiting. The attacks come on at any time of the day or night. During the attacks he has the sensation as though he was being spun around rapidly, and the outside world seems to be moving around. He claims to have fallen in some of the more severe attacks, and when he does fall it is always to the right side. He claims that the right ear is of little use to him because of noises and deafness. The noises resemble the blowing off of steam; occasionally it is like the jingling of tools. He has never had any pain in the ear but experiences the sensation as though there was a bubble of water in it. He has never had any trouble with his left ear.

He was treated in London a few years ago by inflation, with apparent improvement. He was recently treated by a Philadelphia ear specialist, who likewise inflated the ear, but with no results. He had a submucous resection of the nasal septum performed by Dr. H. M. Goddard in the spring of 1916, with the hope of improving his ear condition, but without results. He complains of what he believes to be catarrh of the nose and denies having had any throat trouble. He suffers with more or less pain and stiffness in the back of the neck, especially on the right side, and with a feeling as though the head was too heavy for the neck. His principal complaint and the one for which he seeks relief is the intense vertigo and nausea.

The functional hearing test revealed the following findings: On the right side, conversational voice, four meters; whispered voice, seventy-five centimeters; acoumeter, thirty centimeters. Schwabach slightly shortened, Rinné positive, but less so than normal. C₁ slightly shortened, C₄ normal (?). Air conduction for the middle tone fork was shortened. On the left side conversational voice, whispered voice, acoumeter, Schwabach.

Rinné, C₁, C₄, air conduction were all normal. The Weber test was referred to the left side.

The patient observed that during the tests the forks sounded as though they were of a higher pitch on the left than on the right side. Furthermore, the patient was somewhat uncertain in his answers when testing the right side because of the presence of subjective noises on that side.

Otoscopic examination revealed on the right side the membrane intact, brilliant and sufficiently translucent to permit of a view of the long process of the anvil. The hammer handle was in normal position, indicating the absence of retraction or bulging. The membrane moved freely and normally with the Siegle instrument, but less than normal during inflation with the Politzer bag, suggesting a relative obstruction in the eustachian tube.

The findings on the left side were practically the same as those on the right, with the exception that there was freer mobility of the membrane during inflation.

Rhinoscopic examination revealed a moderate deviation of the septum to the left side. The middle turbinate on that side was not visible prior to shrinking the mucous membrane, because of the septal deviation. The mucous membrane on both sides was generally relaxed, but of quite normal color. After shrinking with 20 per cent cocaine solution, the greater part of the turgescence disappeared, revealing a moderate degree of hyperplasia along the inferior edges of both inferior turbinates. There was no gross evidence of sinus disease on either side.

Mouth and throat examination revealed nothing especially wrong. The teeth appeared to be in normal condition, the tonsils were small and firm, while the crypts were free of deposits when compressed with the pillar retractor. There was the slightest evidence of secondary catarrhal pharyngitis. With the Holmes nasopharyngoscope both eustachian orifices appeared the same and normal, in spite of which, after cocaine anesthesia to the right tube followed by gentle probing with No. 4 Yankauer sound and inflation, the patient claimed relief from the discomfort previously felt in the right ear.

He was then tested for equilibrium disturbances, with the following results: Slight hesitancy and unsteadiness in the

gait with eyes closed, combined with a tendency to swerve to the right, which was not present with the eyes open. Owing to the patient's general anxiety and dread of being upset, some of the more severe tests were postponed.

Examination of the eyes for nystagmus showed the slightest degree of spontaneous rotary nystagmus to the left when looking straight ahead. Incidentally it was noted that the right pupil was a trifle larger than the left; however, both reacted promptly to light, accommodation and convergence. The deep muscular reflexes were prompt and of normal amplitude. No surface anesthesia or analgesia was present in the face, neck, upper chest region, arms, hands, legs or feet. The remaining parts of the body were not tested.

He was directed to report a few days later. In the meantime a Wassermann test was made from the patient's blood, and the report received from the Philadelphia Clinical Laboratory, under date of June 23, 1916, was that the Wassermann reaction was negative.

On June 22nd the patient reported for further study. While in the waiting room, his wife, who accompanied him, knocked at the door to tell me that Mr. G. was in the midst of a severe attack of vertigo which had come on a few minutes before. I hastened out to see him and observed the presence of an intensive rotary nystagmus to the left side, of wide excursions. He was helped to a couch in another room and watched closely. In spite of the intensive vertigo he did not vomit, but felt as though he might. This attack gradually subsided, so that after an hour's rest the nystagmus, although still present, had diminished perceptibly. I instructed his wife to keep him on the couch in a lying posture for a still longer time, so that in all he remained there for three hours. When he finally got up, he claimed to be feeling fairly good.

In describing the attack, he told me that it was less severe than many others he had had. Judging from the intensity of the nystagmus, the vertigo must have been very severe, for the eyes were jumping at a rate comparable with the first few seconds following the turning tests. He claimed that the attack, like previous ones, was accompanied by a feeling of stiffness in the neck and an increase in the noises in the right ear. He complained also of a tight feeling around the head.

more especially in the frontal region. He claimed that this attack in the office was the third he had suffered during the last fourteen hours.

It was decided not to do much in the way of a further ear examination that day, and the remaining time was spent on the examination of the eye grounds, which revealed a slight overfilling of the veins in the retina of the right eye. They were not, however, unduly tortuous. The disc appeared to be sharply defined, the physiologic cup normal in size and depth but somewhat poorly defined. The arteries were markedly streaked and surrounded with connective tissue on the disc but not beyond. No changes were noticeable in the macular region or elsewhere in the retina.

The ophthalmoscopic picture of the left fundus was practically the same as that of the right, with the exception that the veins appeared to be less full. The vision with the correction that he was wearing was 6/6 full in each eye, taken separately. On account of his improved condition over that of some time before, another test of the hearing function was made, which resulted in practically the same findings as on the previous visit.

His next visit was on June 26th, when he reported that on the day following his last visit he did not have an attack of vertigo, but on the day after—that is, on the 24th—he suffered two attacks, but less severe than the attack on the 22nd. He claims to have observed that the attacks are prone to come on after reading some length of time.

At this visit (June 26th) he recalled that he had been placed on a strictly milk diet for six weeks during the early part of the year, and for this entire period he was free of vertigo, and after stopping the milk diet the vertigo returned. He told me, further, that he suffers with habitual constipation, but during the period that he was on the milk diet the constipation was corrected, and that since quitting the milk diet he is as constipated as he was before going on this diet.

Dr. Weston D. Bayley, of Philadelphia, by whom he was treated a few months ago, thought that perhaps there was some form of stomach or bowel trouble responsible for the patient's vertigo, and accordingly sent him to Dr. Thomas Bradley for a comprehensive study of the case from that

angle. Dr. Bradley made a careful analysis of the stomach contents after test meals and had the stomach X-rayed by Dr. Walter C. Barker to note its behavior during the digestion of a meal containing bismuth. In spite of the negative findings by Drs. Bradley and Barker, Dr. Bayley contended that there was a strong probability of something wrong in the gastrointestinal tract which was responsible for the vertigo.

At this time (a few months before I saw the patient) he was also under treatment by an ear specialist, who told him that he was nervous and overestimated the severity of the attacks. According to the wish of the patient and because of the apparent relief obtained on the previous visit, the right eustachian tube was treated with a No. 4 Yankauer probe, followed by inflation. There was a favorable response and the patient expressed himself as feeling "elated."

On June 29th the patient reported that on the morning following his last visit he suffered a mild attack of vertigo which passed off in about half the usual time and that he has had no other attacks since. From this time on the patient visited me for several months at more or less regular intervals (semi-weekly). On each of the visits some additional information was obtained in the way of history and findings. Among other things, tests of the hearing and static function were repeatedly made, as well as tests for visual acuity, visual fields, eye muscle tests, blood tests and roentgenograms.

From the standpoint of symptomatology it was learned that the patient complained of poor memory, occasional numbness in the right side of the face, a sensation of internal fullness, excessive fullness, bloating in the stomach and bowels, with occasional eructations and the passing of excessive gas. It was the gastrointestinal symptoms that prompted Dr. Bayley to send the patient to the stomach specialist, and which, as we shall learn later, had some foundation in the chronic infection in the appendix, which since its removal have cleared up with many of his other symptoms.

Careful tests of his visual acuity made on the 22nd of June and on several occasions since, revealed 6/6 full in each eye separately. The fields of vision were taken first on June 22nd and on one or two occasions since, and the results were normal findings in each instance. Tests for paresis of extra-

ocular eye muscles were made with the red glass before one eye, which resulted in the patient seeing but a single image in all fields. The Maddox rod test revealed no heterophoria.

Analysis of the urine made at the Philadelphia Clinical Laboratory revealed a normal amount for 24 hours, normal color, clear consistency, acid reaction, specific gravity 1025, the absence of sugar, albumen, and casts.

Tests of the static labyrinth and nerve were made after the galvanic method on several occasions. The first test was made June 19, 1916, at which time the right side reacted to the cathode with a current strength of five milliamperes and with the anode to five milliamperes, the left side to the cathode with five milliamperes and to the anode with five milliamperes.

This was during a visit when the patient was comparatively free of vertigo. Tests were not made on any day when the patient was complaining especially of the vertigo. One of the tests made a day or two after suffering intensive vertigo, the reaction was found to be less evenly balanced on the two sides and required stronger strength of current on the right side; for instance, on November 16, 1916, the right side reacted to the cathode with a current strength of eight milliamperes and to the anode with eight milliamperes, while on the left side there was positive reaction to the cathode with four milliamperes and to the anode with six milliamperes. It was noted that the reactions fluctuated with the patient's condition, but at no time was there failure of reaction to galvanism when applied to the right side.

The roentgenologic reports are quite interesting and, therefore, I will report them verbatim:

"The accessory sinuses leading from the nasal cavities are all very large. They cast clear shadows and the two sides compared with each other show that there is no thickening nor retained secretions. The nasal septum seems to occupy the median line. The turbinated bones and bodies seem perfectly normal. On the left side they occlude the whole nasal cavity, while on the right side there is more free space.

"The mastoid cells on either side are large and clear cut. Comparing the petrous portions of the temporal bone, the right side shows the arcuate eminence to be much more prominent. This prominence corresponds to the superior semi-

circular canal. In the stereoscopic plates the superior and posterior semicircular canals show distinctly, the arcuate eminence is very transparent. The cellular appearance is due to the mastoid cells showing through. There is a denser eminence near the base of the temporal bone which corresponds to a position above and a little beyond the cochlea. Considered in conjunction with the clinical findings, there is an indication of a tumor of the right petrous portion of the temporal bone at or near the superior semicircular canal. Considered without the clinical evidence, this overgrowth might be an anomaly."

Prior to my having received this report from Dr. Barker, I had decided to put the patient on potassium iodid in material doses, notwithstanding the negative Wassermann finding. Under this treatment the patient improved very materially so that by January, 1917, I decided to have further roentgenologic examinations of the right temporal bone with the object of proving that the condition might be a gumma, in which case the eminentia arcuata, at least theoretically, should be smaller in size. Dr. Barker's second report on January 12th reads as follows:

"Stereoscopic examination of the petrous portion of the temporal bones taken anteroposteriorly and laterally showed the eminentia arcuata is more prominent on the right side than on the left, and by careful measurement I can find no difference in the size from the examination made on July 15, 1916.

The posterior tip as it appears on the later roentgenograms is not as sharply outlined as in the former examination. It is not possible to say whether this would suggest a breakdown or a slight change in the angle of reflection, but I think it is due to a slight change in the angle. The semicircular canals are still clearly outlined, indicating no encroachment upon their lumen."

On March 20, 1917, I received the following report of a third examination made by Dr. G. E. Pfahler, of Philadelphia, which reads:

"The teeth show an abscess completely surrounding the roots of the left lower molar. I think this is probably a pyorrhea pocket that has extended downwards.

There is also an apical abscess or granuloma at the apex of the left lower second bicuspid. There is an abscess at the apex of the right lower first molar, with a pyorrhea pocket under the anterior surface of the crown.

There is a pyorrhea pocket extending deeply between the right lower bicuspids.

In the right upper jaw there are pyorrhea pockets extending down along the roots of the remaining molars, and a small abscess at the apex of the left upper tooth to which the bridge is attached, which, I think, is the first bicuspid, and a pyorrhea pocket extending almost to the apex of the posterior root of the tooth to which the bridge is attached.

Examination of the cranium shows on the right side an erosion of a portion of the inner table of the skull over an area about two inches in length and beginning at about the coronal suture.

There appears to be also a calcareous deposit in an area about two inches in diameter, which I have marked with small arrows. I believe this could be a brain tumor or a gumma. It is lying just anterior to the leg center, but it seems to me that he should have some irritation or some very slight disturbance of his motor function, especially in the left leg, but perhaps in both.

There is certainly thinning of the inner table of the skull and some compression of the diploe. This compression of the diploe would lead me to think that this has been a very slow process, as his history would indicate.

There is also some thinning in the region of the cuneus. If this is due to any pathology it should give rise to distinct ocular disturbances. In the absence of any ocular disturbance, I believe this latter lesion should be ignored.

I see nothing abnormal in the cerebellum nor in the region of the petrous portion of the temporal bone.

The mastoid cells are clear on both sides.

The frontal sinuses are large and clear.

The sphenoids are clear.

The ethmoids show some exudate, but I believe no more than occurs in the average person in this weather.

The maxillary sinuses are clear.

Examination of the cervical vertebra shows some com-

pression of the fifth and sixth cervical. The bodies of these two vertebra are only about two-thirds their normal thickness. However, the edges are so sharply defined that I question whether there is any active lesion present now.

Elsewhere in the vertebra I see nothing abnormal.

As a whole, therefore, I find strongly suggestive evidence of a neoplasm anterior to the upper motor area on the right side of the head; old disease of the fifth and sixth cervical vertebra, a number of abscesses about the teeth. The lesions in the vertebra and in the head would suggest to me the necessity for a Wassermann test. I will appreciate it very much if you will let me know the final diagnosis in this case, etc."

The patient was referred to Dr. T. D. Casto (dentist), who wrote me on March 23, 1917, that he "recommended the extraction of the left lower second bicuspid and the removal of the upper left bridge attached to the second bicuspid and the second molar. On the lower right it is best to leave the second molar remain, recommending another picture in forty days, etc."

The patient preferred, however, to go to his regular dentist, Dr. M. T. Barrett, who I have learned since removed the left lower second molar and left lower bicuspid. In the meantime he treated the patient for pyorrhea with apparently good results.

The patient remained with me under treatment for his vertigo and impaired hearing in the right ear. His improvement was progressive until June, 1917, when he felt so much improved that he decided to go off on a vacation for two months in the Adirondacks. I did not see him again until October 26, 1917, when he reported that during the latter part of the summer he developed a severe attack of appendicitis with gangrene and peritonitis, when he was hurried to New York City and operated by Dr. Harold D. Meeker, who removed the appendix and besides a large gallstone. The patient reports that since he feels much better and has practically no vertigo excepting momentarily upon arising in the morning. He claimed also to be hearing better. However, careful hearing tests show the same character of findings, so far as the fork tests are concerned, but less pronounced evidence of deafness in the right ear than when first seen.

From the side of the vestibular apparatus there was no evidence of nystagmus when looking straight ahead. The galvanic reaction showed the eighth nerve on the right side to be slightly under function, in that the reaction to the cathode on that side was with six milliamperes current strength, anodal reaction four and one-half milliamperes. On the left side the nerve reacted to the cathode with a current strength of five milliamperes, and to the anode with six milliamperes.

Tests for equilibrium disturbances revealed none.

Since the removal of his appendix the patient has felt decidedly improved from every angle.

In reply to a letter sent to Dr. Meeker, the general surgeon who operated Mr. G., I received the following, under date of February 23, 1918:

"My Dear Dr. Mackenzie—This tardy reply to your letter is due to the fact that I have been in foreign military service. I operated upon Mr. G. on August 10, 1917, for an acute gangrenous appendicitis. The pathologic conditions in the neighborhood of the appendix were as follows:

The terminal ileum was fixed in sharp angulation to the posterior abdominal wall below the brim of the true pelvis. The appendix was gangrenous at its distal half, the proximal portion being firmly adherent beneath a large cecal pouch fixed in a position of internal rotation by firm fibrous bands. These conditions, other than the acute process in the appendix, judging from the density and firmness of the fixation bands, had existed for several years, and were of such a nature as to be prime factors in the production of intestinal toxemia, both from the mechanical back pressure and from the dilated, thin walled cecal cesspool. The appendix was removed, constricting bands divided, raw surfaces covered by peritoneal flaps, the dilated cecum and ascending colon plicated by the union of the external and anterior longitudinal bands.

I have had three cases during the past year with eighth nerve symptoms, operated for marked intestinal stasis with an apparent cure of the auditory symptoms.

I should be greatly interested to know what effect Mr. G.'s operation has had upon his eighth nerve symptoms.

Very sincerely yours,

(Signed) H. D. MEEKER."

In commenting on the case, there can be no doubt as to the diagnosis of neuritis of the eighth nerve and that both branches were involved, for the following reasons:

1. That so far as the hearing function is concerned, the fork findings were characteristic in every particular for a disease of the perceiving apparatus (cochlea, nervus cochlearis, or both combined).

2. That the presence of vertigo with nystagmus to the left (unaffected side) speaks for a destructive or relatively destructive lesion of the static labyrinth, nervus vestibularis, or both combined.

3. That the cochlear and vestibular nerves were involved rather than the labyrinth is indicated by the relatively negative findings in the middle ear. The labyrinth, as is well known, is involved in an inflammatory process as a result of extension of inflammatory processes from the middle ear, or the extension of inflammation from the meninges via the nerves; so that in the absence of pronounced middle ear involvement there is reason to believe that the labyrinth itself escaped inflammation from that side, and since the inflammation of the eighth nerve was at no time sufficiently intensive as to cause complete loss of function, it is highly improbable that the inflammation could have extended to the labyrinth by this route.

Concerning the etiology, syphilis was the least to be suspected cause, for syphilis though commonly a cause for bilateral eighth nerve neuritis, is a very exceptional cause for the unilateral form. It rarely happens that a more or less circumscribed gumma may affect the eighth nerve of one side. When it does, there are usually plenty of other symptoms present which were lacking in this case.

That there was improvement under the administration of potassium iodid, is no proof that the neuritis was of syphilitic origin; for the so-called rheumatic conditions and neuritis are generally known to improve under its administration.

In ascertaining the causes of neuritis, single or multiple, unilateral or bilateral, many factors must be considered, for we find neuritis following almost all the acute infectious fevers, the so-called postinfectious type. We find neuritis occurring in the course of the chronic infections, more espe-

cially those tending toward the production of granulomatous infiltrations (syphilis, tuberculosis and leukemia). We find neuritis caused by many poisons taken into the system (toxic neuritis), alcohol, tobacco, lead, arsenic, mercury, carbon-monoxide, illuminating gas, quinin, salicylates and numerous other poisons. Finally it may occur from the absorption of toxins into the general circulation, the source of which may be a chronic focus of pus infection in some more or less distant part of the body. This form is what some of the earlier authors referred to as the rheumatic type, while others referred to it as the refrigeratory type, since in many of the cases the neuritis developed after an exposure to cold and dampness. It is into this latter class that we shall eventually find placement for most of the unilateral cases of eighth nerve neuritis, including the one under discussion. In the case herewith reported I have placed it in the class of focal infection after having ruled out by the negative history and findings all the other class of causes.

Among the many foci of infection that could have been considered as a possible cause of the neuritis in this case, the nasal accessory sinuses were ruled out because of the negative findings, both from the rhinoscopic and roentgenologic aspect. The tonsils were ruled out because of their small size and open and clean crypts, the absence of a history of tonsillitis and congestion of the anterior pillars. The teeth may be ruled out since the greatest improvement in the case was obtained prior to any attention that was given to them. Therefore, in the absence of any other known focus of pus together with the positive findings of pus in the appendix, which after its removal, was followed by so pronounced an improvement in all symptoms would seem to fix the etiologic factor there rather than elsewhere.

A few words as to the part played in the case by the various gentlemen whose names appear in this report. Dr. Fellows, the family physician, realized early that the case was one of more than ordinary importance and wisely referred it to Dr. Bayley (neurologist). Dr. Bayley, who had merely the patient's history to guide him, and at a time when the symptoms were more those of the digestive disturbances than anything else and in the absence of neurologic findings, naturally referred

the case to Dr. Bradley (stomach specialist). Dr. Bradley made a most careful analysis of the stomach contents after a test meal and studied the behavior of the stomach during digestion with the co-operation of Dr. Barker (roentgenologist). Their findings were negative for the reason that the patient's trouble was farther below. Dr. Bayley, in spite of the negative reports from Drs. Bradley and Barker, still contended that there was something wrong with the digestive tract, and in this respect future events proved Dr. Bayley to be correct. That someone had not discovered the latent appendicitis is not to be wondered at, for the best that one can do in this type of case is merely to suspect the condition and await further developments, for no one would care to suggest operation in any case upon suspicions alone in the absence of definite findings.

That the London specialist succeeded in obtaining some transient relief for the patient's ear condition by Politzer inflation was due to the fact that the patient had a mild obstruction of the eustachian tube, which accounted in a measure for the sensation of fullness and of a bubble of water in the right ear. These sensations were probably due to a negative pressure in the middle ear and were naturally improved by the substitution of a positive pressure. That Dr. Goddard should have performed a submucous resection was justifiable in the presence of a deviated septum to the side corresponding to the obstructed eustachian tube.

Concerning the roentgenologic reports of Drs. Barker and Pfahler, there can be no criticism, for both did their parts well, so far as could be expected. The pictures made by these gentlemen are perfect and their interpretations well founded. Dr. Barker found an anomalous eminentia arcuata on the right side that was not present on the left (unaffected side), and it was a fairly good presumption on his part to suspect the condition as one of gummatous infiltration of the temporal bone.

That Dr. Pfahler because of the absorption of diploe and the thinning of the inner table of the skull on the right side anterior to the motor area should suspect a neoplasm, was perfectly justifiable, and in the presence of the thinning of the bodies of the fifth and sixth cervical vertebra to suspect

these multiple bone lesions to be of probable luetic origin was quite natural. However, in the presence of the after-developments the diagnosis of tumor must be excluded, besides the absence of intensive headaches and choked disc would certainly exclude such a diagnosis.

Dr. Casto (dentist), after studying Dr. Pfahler's report and some films of his own making, suggested the removal of the second lower bicuspid tooth and the conservative treatment of other questionable teeth until such time as they were no longer questionable. In doing so he was following the dictates of his own experience as well as the experience of our best dental surgeons.

Dr. Barrett (dentist), to whom the patient went, put into effect, and upon his own initiative, the suggestions offered by Dr. Casto, and with excellent results, so that at this time the patient's remaining teeth are in excellent condition. Had it not been for the acute exacerbation of the chronic appendicitis and its successful operation by Dr. Meeker (surgeon), there would have been lost to us the most important and instructive feature of the case, namely, the diagnosis of an obscure appendicitis cured by operation which in turn cured the patient of all his other troublesome symptoms, the most bothersome of which was the neuritis of the eighth nerve.

A neuritis of the eighth nerve of one side that destroys the hearing and equilibrium rapidly and completely is far less discomforting than a less intensive neuritis, such as this patient had, which was fluctuating between destruction and restitution.

The case just cited in most particulars is quite like others I have seen. The majority of them have been of focal infectious origin, and they comprise a class, as previously stated, that are most intricate and interesting to study. The etiology can be determined only after a most exhaustive search according to a definite plan and systematic method of exclusion.

XXX.

GASPARO TAGLIACOZZI AND HIS CONTRIBUTION
TO RHINOPLASTY.

BY MORTIMER FRANK, B. S., M. D., AND IRA FRANK, M. D.,
CHICAGO.

The early part of the sixteenth century must always rank among the most remarkable periods in the history of civilization. The invention of printing had made literature the property of many to whom it had hitherto been inaccessible. The downfall of the Byzantine Empire scattered over Europe numbers of fugitive Greeks, who carried with them to the Western world many treasures of classical literature. Raphael, Michelangelo and others revived the glory of the ancients in the realm of art. The narrow limits of the old world had vanished, and the Spanish and Portuguese navigators opened up the way to vast new domains, while the Reformation revolutionized the spirit of mankind and put an end to the age of ignorance and superstition.

During this active period the greatest discoveries in the study of anatomy took place. Every part of the human frame was carefully studied and important discoveries made. Andreas Vesalius, the reformer of anatomy, who had the courage to set aside the teachings of Galen and undertake a new arrangement for anatomic instruction; Eustachi, his contemporary, for his observations of the internal ear and the tube which bears his name; Falloppio, who rectified the knowledge then possessed of the anatomy of the ear; and William Fabry of Hilden, a pupil of Falloppio, who merits distinction for his efforts in the comparative anatomy of the ear and larynx and for the employment of the tube in tracheotomy.

It was in this century that Gasparo Tagliacozzi (Tagliacotius, Taliacotius*), professor of anatomy and surgery in the

*In "The Gentleman's Magazine," London, 1794, LXIV, 1093, a correspondent whimsically insinuates whether the Latin name Taliacautius is not taken from the Italian tagliare and cauto, or cautamente—i. e., to cut out with caution or judgment, and so applied as a nickname to this celebrated surgeon.

University of Bologna, revived and improved the operation for the formation of a new nose by the use of the skin over the biceps muscle of the individual, now known as the Talia-cotian operation. Tagliacozzi was born at Bologna in the year 1546 and died there November 7, 1599, when fifty-three years old. Very few particulars have been recorded of the life of this distinguished surgeon. Three other Italian surgeons, Vincentio, Vianco, Bogani, and the itinerant operators, the Brancas of Catania, achieved distinction before him as the first who attempted and successfully performed the operation of rhinoplasty. They cut a piece of flesh from the arm, leaving only a few fibers attached to the extremity, and adapting it to the shape of the nose, keeping the raw surfaces in contact by binding the limb across the face, and finally when the adhesion became completed, cut the part entirely away from the arm.

Fallopio, Vesalius, Paré, and Fabry thought it their duty to apologize for this novel operation of grafting, as Tagliacozzi called it, but such was his enthusiasm in favor of the operation that he maintained that the new nose possessed the sense of smell more acutely than the natural one, and not without some success, for he aroused the enthusiasm of his fellow citizens to such a pitch that they erected in the high school of Bologna several laudatory tablets, and after his death placed in the anatomic theater of the university a bust in his honor that represented him holding a nose in his hand. These have since disappeared. The theologians of his own time bitterly attacked him and accused him of impiously interfering with the function of the Creator, attributing the success of his operation to the devil. Their hostilities pursued him even to the grave. He was interred in the Church of San Giovanni Battista, and the report was circulated that a few weeks after his burial a mysterious voice was heard crying out "Tagliacozzi is damned." Thereupon the Bolognese clergy ordered the remains exhumed and buried in unconsecrated ground. During the following century Butler in his "Hudibras"** satirized Tagliacozzi, and the stanza was used as the

*Canto I, Part I, line 281 to 286.

text for a humorous account of him by Addison and Steele in the "Tatler."

"No. 260. THURSDAY, DECEMBER 7, 1710.

Non cuicunque datum est habere nasum. Mart. i. 42.
The nose, 'tis said, shows both our scorn and pride,
And yet that feature is to some deny'd.—R. Wynne.

From my own apartment, December 6.

We have a very learned and elaborate dissertation upon thumbs in Montaigne's Essays, and another upon ears in the "Tale of a Tub." I am here going to write one upon noses, having chosen for my text the following verses out of "Hudibras":

'So learned Taliacotius, from
The brawny part of porter's bum
Cut supplemental noses, which
Would last as long as parent breech;
But when the date of Nock was out
Off dropt the sympathetic snout.'

Notwithstanding that there is nothing obscene in natural knowledge, and that I intend to give as little offense as may be to readers of a well bred imagination, I must, for my own quiet, desire the critics, who in all times have been famous for good noses, to refrain from the lecture of this curious Tract. These gentlemen were formerly marked out and distinguished by the little rhinocerical nose, which was always looked upon as an instrument of derision; and which they were used to cock, toss, or draw up in a contemptuous manner, upon reading the works of their ingenious contemporaries. It is not, therefore, for this generation of men that I write the present transaction,

..... Minus aptus acutis
Naribus horum hominum.—Hor. Sat. i. 3. 29.
..... Unfit

For the brisk petulance of modern wit.—Francis.

but for the sake of some of my philosophical friends in the Royal Society, who peruse discourses of this nature with a becoming gravity, and a desire of improving by them.

Many are the opinions of learned men concerning the rise

of that fatal distemper, which has always taken a particular pleasure in venting its spite upon the nose. I have seen a little burlesque poem in Italian that gives a very pleasant account of this matter. The fable of it runs thus: Mars, the god of war, having served during the siege of Naples in the shape of a French colonel, received a visit one night from Venus, the goddess of love, who had been always his professed mistress and admirer. The poem says she came to him in the disguise of a suttling wench, with a bottle of brandy under her arm. Let that be as it will, he managed matters so well that she went away big-bellied, and was at length brought to bed of a little Cupid. This boy, whether it were by reason of any bad food that his father had eaten during the siege, or of any particular malignity in the stars that reigned at his nativity, came into the world with a very sickly look and crazy constitution. As soon as he was able to handle his bow he made discoveries of a most perverse disposition. He dipped all his arrows in poison that rotted everything they touched; and, what was more particular, aimed all his shafts at the nose, quite contrary to the practice of his elder brothers, who had made a human heart their butt in all countries and ages. To break him of his roguish trick, his parents put him to school to Mercury, who did all he could to hinder him from demolishing the noses of mankind; but, in spite of education, the boy continued very unlucky; and though his malice was a little softened by good instructions, he would very frequently let fly an envenomed arrow and wound his votaries oftener in the nose than in the heart. Thus far the fable.

I need not tell my learned reader that Correggio has drawn a Cupid taking his lesson from Mercury, conformable to his poem, nor that the poem itself was designed as a burlesque upon Fracastorius.

It was a little after this fatal siege of Naples that Talia-cotius began to practice in a town of Germany. He was the first love-doctor that I meet with in history, and a greater man in his age than our celebrated Dr. Wall. He saw his species extremely mutilated and disfigured by this new distemper that was crept into it and, therefore, in pursuance of a very seasonable invention, set up a manufacture of noses, having first got a patent that none should presume to make

noses besides himself. His first patient was a great man of Portugal, who had done good services to his country, but in the midst of them unfortunately lost his nose. Taliacotius grafted a new one on the remaining part of the gristle or cartilaginous substance, which would sneeze, smell, take snuff, pronounce the letters M or N, and, in short, do all the functions of a genuine and natural nose. There was, however, one misfortune in this experiment; the Portuguese's complexion was a little upon the subfusc, with very black eyes and dark eyebrows; and the nose being taken from a porter that had a white German skin, and cut out of those parts that are not exposed to the sun, it was very visible that the features of his face were not fellows. In a word, the Conde resembled one of those maimed antique statutes that has often a modern nose of fresh marble glued to a face of such a yellow, ivory complexion as nothing can give but age. To remedy this particular for the future, the doctor got together a great collection of porters—men of all complexions, black, brown, fair, dark, sallow, pale, and ruddy, so that it was impossible for a patient of the most out-of-the-way color not to find a nose to match it.

The doctor's house was now very much enlarged, and became a kind of college, or rather hospital, for the fashionable cripples of both sexes, that resorted to him from all parts of Europe. Over his door was fastened a large golden snout, not unlike that which is placed over the great gates at Brazen-nose college in Oxford; and, as it is usual for the learned in sentence, the doctor writ underneath this great golden pro-foreign universities to distinguish their houses by a Latin boscis two verses out of Ovid:

“Militat omnis amans, et habet sua castra Cupido;
Attice, crede mihi, militat omnis amans.”

—Ovid. *Amor. El. ix. i.*

The toils of love require a soldier's art;
And every lover plays the soldier's part.

It is reported that Taliacotius had at one time in his house twelve German counts, nineteen French marquises, and a hundred Spanish cavaliers, besides one solitary English esquire,

of whom more hereafter. Though the doctor had the monopoly of noses in his own hands, he is said not to have been unreasonable. Indeed, if a man had occasion for a high Roman nose, he must go to the price of it. A carbuncle nose likewise bore an excessive rate; but for your ordinary short turned up noses, of which there was the greatest consumption, they cost little or nothing; at least, the purchasers thought so, who would have been content to have paid much dearer for them rather than to have gone without them.

The sympathy betwixt the nose and its parent was very extraordinary. "Hudibras" has told us that when the porter died the nose dropped, of course, in which case it was always usual to return the nose, in order to have it interred with its first owner. The nose was likewise affected by the pain as well as death of the original proprietor. An eminent instance of this nature happened to three Spaniards, whose noses were all made out of the same piece of brawn. They found them one day shoot and swell extremely; upon which they sent to know how the porter did, and heard, upon inquiry, that the parent of the noses had been severely kicked the day before and that the porter kept his bed on account of the bruises it had received. This was highly resented by the Spaniards, who found out that the person that had used the porter so unmercifully, and treated him in the same manner, as if the indignity had been done to their own noses. In this and several other cases it might be said that the porters led the gentlemen by the nose.

On the other hand, if anything went amiss with the nose, the porter felt the effects of it, insomuch that it was generally articed with the patient that he should not only abstain from all his old courses but should, on no pretense whatever, smell pepper or eat mustard on which occasion the part where the incision had been made was seized with unspeakable twinges and prickings.

The Englishman I before mentioned was so very irregular and relapsed so frequently into the distemper which at first brought him to the learned Taliacotius, that in the space of two years he wore out five noses, and by that means so tormented the porters that if he would have given five hundred pounds for a nose there was not one of them that would

accommodate him. This young gentleman was born of honest parents, and passed his first years in fox hunting; but accidentally quitting the woods and coming up to London, he was so charmed with the beauties of the playhouse that he had not been in town two days before he got the misfortune which carried off the part of his face. He used to be called in Germany "the Englishman of five noses" and "the gentleman that had thrice as many noses as he had ears." Such was the raillery of those times.

I shall close this paper with an admonition to the young men of this town, which I think the more necessary because I see several new fresh colored faces, that have made their first appearance in it this winter. I must therefore assure them that the art of making noses is entirely lost, and, in the next place, beg them not to follow the examples of our ordinary town rakes, who live as if there was a *Taliacotius* to be met with at the corner of every street. Whatever young men may think, the nose is a very becoming part of the face, and a man makes but a very silly figure without it. But it is the nature of youth not to know the value of anything till they have lost it. The general precept, therefore, I shall leave with them is to regard every townwoman as a particular kind of siren that has a design upon their noses, and that, amidst her flatteries and allurements, they will fancy she speaks to them in that humorous phrase of old Plautus, *Ego tibi faciem denasabo mordicus.* "Keep your face out of my way or I will bite off your nose."

In this way the Tagliacotian method fell into disrepute and was forgotten for nearly two centuries until revived by Diefenbach.

The first medical author extant to mention this operation since the revival of letters is Alexander Benedictus, a Veronese professor at Padua, in 1495. He took his flap from the patient's arm, and adds that these artificial noses badly endure the winters. All the medical and surgical writers from Celsus to this date are silent upon this subject. About the middle of the first century Celsus treats on the mode of repairing fractures of the nose in the fifth chapter of his eighth book

*Ges. hichte der Chirurgie, 1898.

("De Medicina"), but says nothing about autoplastic operations.

Von Gurlt,* in his account of Tagliacozzi, says that he accepted for himself a credit which in reality belonged to certain Sicilian and Calabrian surgeons. About the middle of the fifteenth century there lived in the city of Catania, on the coast of Sicily, a surgeon by the name of Branca, who devoted himself almost entirely to the reconstruction of injured and defective noses. Branca used the ancient Hindu method of transplanting the skin of the forehead or cheek for his flap, but later this was improved upon by his son, who utilized a flap of skin from the arm, thus avoiding any further disfigurement of the face. In 1442 the Neapolitan poet, Calentino, wrote to his friend Orphian, who had lost his nose: "If you want a new nose pay me a visit. Branca, a Sicilian surgeon, has found a way to restore lost noses. He either takes flesh from the patient's arm or engrafts on him a slave's nose. The thing is truly marvelous! As soon as I saw it I made haste to send you the news, for to whom could it be more important? Rely upon it, if you come hither you can go away with as many noses as you like."

Pupils of the younger Branca demonstrated the method to the Bojano family in Tropea, Calabria. Both families were itinerant surgeons and practiced the method as a family secret. From them it was transmitted about the middle of the sixteenth century to Tagliacozzi, to whom belongs the credit of first fully describing the operation.

Wojciech Oczka, a Polish surgeon, published a book on syphilis and surgery in 1581, and in it says that Aranzio (or Arantius), who was professor of surgery at Bologna at the time (1569) when he was at the school, was successful in making a new nose by transplanting a skin flap from the arm. As this was done at Bologna several years before Tagliacozzi's time and before the date (1586) of Tagliacozzi's earliest comment, Von Gurlt says it furnishes ample proof that the credit for introducing rhinoplasty to European surgeons belongs to Aranzio rather than to Tagliacozzi.

Fabry of Hilden in his *Observationum et curationum medico-chirurgicarum centuriae*, Frankfort, 1646, 214, relates that his teacher, Jean Griffon, of Lausanne, performed the same

operation in 1590. "Year 1590. When the Duke of Savoy made war upon Geneva, a virgin fell into the hands of the soldiers. When they tempted her in vain, being enraged, they cut her nose off. About two years after she went to Lausanne, where Jean Griffon, a most ingenious and successful surgeon, then lived. He undertook to cure her and restored her nose so artificially that, to the admiration of all, it appeared rather natural than artificial. I myself have seen her several times, and is still unmarried at Lausanne this present year 1613. It is true that in the cold of winter the tip of the nose looks livid, but is nourished as the other parts of the body and endued with sense. Griffon had some hints of the method from an Italian, as he traveled through Lausanne, who had spoken with the famous Tagliacozzi, though he had never seen the operation performed nor Tagliacozzi's book before he had operated on the maiden. But he cured the maiden in the same manner as described by Tagliacozzi."

The first edition of Tagliacozzi's *De curtorum chirurgia per insitionem, libri duo*, contains twenty-two full page wood engravings or "Icons," and was published in folio at Venice in 1597, two years before his death. It was dedicated to the Grand Duke of Tuscany, to whom Tagliacozzi was the chief surgeon. The second edition, a small octavo, appeared in the following year at Frankfort in 1598. The third and last edition, also in octavo, with six lithographic plates, was edited by Troschel at Berlin in 1831.

The twenty-two "Icons" exhibit, in successive stages, the patient minus his nose and the place on the left arm from whence the flap is to be taken. As the series proceeds to the end, the instruments used are shown, the cucullus, or retentive apparatus, the steps and stages of the operations for restoring the nose, ears and lips. Some of the figures are on a full folio page, others have from two to four figures each. The work is divided into two books. In the first part of the first book numerous references from the Scriptures, Homer, Horace, Plutarch, and others are taken, bearing upon the subject of autoplasty surgery. The second book is devoted to the autoplasty surgery of the nose, ears and lips.

The description of the method of rhinoplasty, as given in the second book, is as follows: "The arm which is to serve

for the flap is entirely bared, either by rolling up the sleeve of the undergarment or by ripping it apart, so that the field is easily accessible for operation and for treatment. The assistants are placed at equal distances, the circumstances governing their stations. The senior should sit at the patient's head at the upper part of the couch, on the right hand side of the operator. He holds firmly the elbow of the patient with his right hand, for the more firmly it rests the better the operation progresses. The left hand is employed where necessary so that it may opportunely aid, or if unemployed may be always ready to serve when the occasion demands. The office of the other is to lift up the skin, and having secured a fold to pass the forceps to aid the surgeon, and presently to hold the forceps while the operator performs the section, and when this has been perfected, to remove the flap. And he who undertook a seat at the left side of the operator or opposite him shall see that the arm does not fall. So each of the assistants shall be so placed that his services will be available in the shortest time and in the most efficient manner. The nod of the operator and not the voice shall be the means of communication which everyone shall observe and be able to interpret instantaneously. By this means the patient is spared. Meanwhile, the surgeon having gotten rid of his flowing and unsuitable sleeves and his arms bared to the elbows, is more able to perform his operation, comes close to the side of the patient and standing ready for any exigency is prepared to go to work. But first the skin on the ventral aspect of the arm from which he desires to take the flap is gently examined and stretched, and he lets it go and again lifts it up, and at length lets it go, so that by this gentle manipulation it will be released from the underlying tissue. The ease with which it can be removed will be in proportion to his success in loosening the tissues, and the more persistent this practice of stretching, the more soft and yielding is the tissue and the more readily can it be handled when it is dissected off. It is then grasped in a fold as it is by the forceps. However, let this precaution be taken, that the parts surrounding do not develop a fever from manipulating the parts and irritable humors thereby forced into the wound. The veins and the branches of the arteries are very close, and so manipulation should

prepare the skin, less any untoward circumstance should befall that part. Everything being ready, the surgeon should make it a special business to delineate, with ink, the size and shape of the flap if he is new to the operation and is performing it for the first time. But when he is experienced the skin is picked up as the necessity of the case warrants, held, given to the assistant on his left, and immediately with each hand he takes the forceps and clamps them onto the flap. In the meantime, if a part of the skin has slipped out of the forceps it must be lifted and stretched again until the fold is correct and the forceps closed firmly and held by the assistant on the left. The surgeon now takes the scalpel in his right hand and commences the incision with the point of the knife. The incision should not be made in haste, but gradually, until it is seen that the design is complete in every part of the forceps. The section having been accomplished, which is the first step in the operation, the knife is laid aside and one or the other of the assistants takes it and perforates the flap either with it or with a probe. The assistant on the left should attempt to force a piece of gauze through the opening thus formed. The skin having been removed, an attempt should be made to form new nostrils and restore the face despoiled of its proper beauty. When, at last, the skin has been dissected from the nose, the surgeon should take further charge of the operation. These preliminaries ought to be followed so that the flap shall be correct and large enough to form the tip of the nose.

The bandages should be so adjusted that the arm cannot be used; the position of the arm is as follows: The upper arm must be lifted up high enough for the forearm to be brought close to the face and to bring the wrist at the upper margin of the forehead. The hand is spread out over the head in a line with the sagittal suture, the lower forearm crossing the coronal suture and the metacarpal region at the top of the head. This is arranged in such a manner that the middle finger touches the line of the lambdoid suture at the angle. In this position there is balance to the face and arms, so that the former declines slightly downwards and looks in a slightly oblique angle at the arm. Nearest to the upper arm is the end of the nose, which forms a union with the inner side of

the arm in a transverse line behind the elbow.

Signs of union should appear by the fourth day, if the time of the operation is in the heat of the summer, when the bandages may be relaxed. But under the wintry heaven, when the bodies are fuller of humors and impurities, the sixth day would be soon enough. The end of the seventh day in the summer should bring union of the parts, but in cold weather such union may be delayed to the tenth day. As for the rest, it may take fourteen days for the adhesions to be complete, or in the winter the twentieth day. The task of forming the tip of the nose will be shortened by the use of a plaster cast or a metallic mold whose hardness will leave a continual impress upon the end of the nose."

The foregoing by Tagliacozzi is a literal translation and pieced together, as the description is scattered in isolated sentences throughout the entire book. It shows with what minuteness of detail the early surgeon approached his work.

Notwithstanding the priority claims of his predecessors, Tagliacozzi perfected rhinoplasty to a greater degree and practiced it more skillfully and extensively, and, what is still more important, wrote the first and only work on the subject which is to be found in the history of surgery for over two hundred years.

G A S P A R I S T A L I A C O T I I

B O N O N I E N S I S .

PHILOSOPHI ET MEDICI PRAECLARISSIMI;

I theoricas ordinarias, & Anatomen in Gymnasio Bononiensi publicè proficiens.

De Curtorum Chirurgia per infitionem;

L I B R I D V O .

*In quibus ea omnia, qua ad huius Chirurgia, Narium scilicet, Aurium, ac labiorum per infusionem restaurandorum cum Theoricas, tum Practicas pertinere sole-
bantur, clarissima methodo cumulatissime declarantur.*

**Additis Cutis Traducis instrumentorum omnium, atque deligationum,
Iconibus, & Tabulis.**

*Cum Indice quadruplici expeditissimo, Capitum singulorum, Anthonum, controveneriorum,
Rerum denique & verborum memorabilium.*

*Cum Privilegijs Summi Pontificis, Cesareo Mæstatis, Christianissimi Regis Galliarum, Regis
Hispaniarum, Senatus Veneti, & aliorum Principum.*



V E N E T I I S , M D X C V I I .

Apud Gasparem Bindonum iuniorum .

ICONES.

Hæc tabula forcipen tricipitem habet pro delineatione longioris cutis propaginis, & cultros ad id operis necessarios.

A Forceps triceps delineatoris cutis propaginis.

MM Lamina forcipis.

DD Linea ipsius lamina, per quam cultro admissa cutis inciduntur.

ee Lamina infernum labrum, & brachium tangens.

CC Lamina supernum labrum, & cutim propaginem respiciens.

EEE Arcus triceps forcipis, à quo nomen sumpsit.

II Coniunctio forcipis.

S Coniunctio clavis.

HH Manubrium ferratum.

F Manubrij serra.

NN Manubrium anulare.

O Manubrij anulus status.

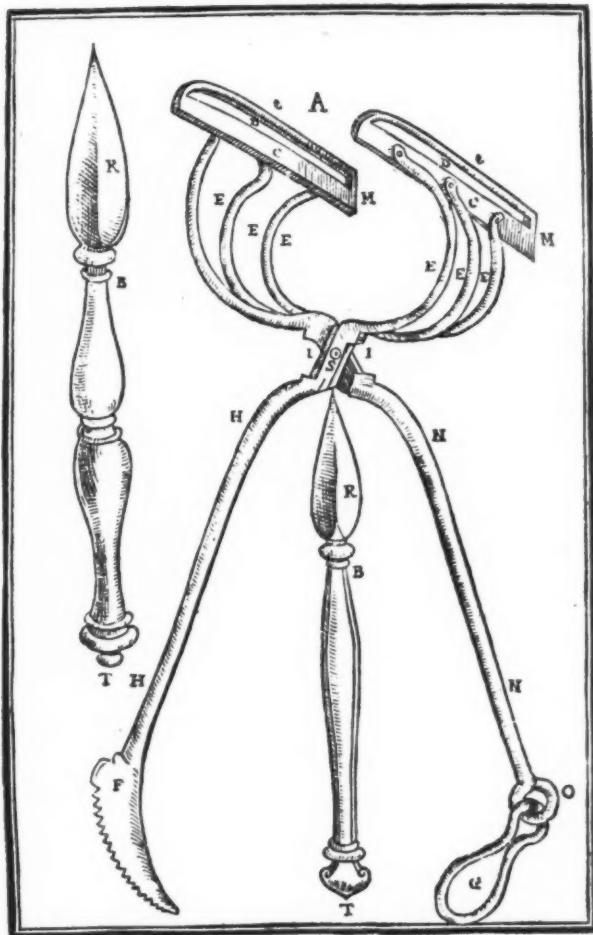
G Manubrij anulus mobilis.

BB Cultri delineanda cuti propagini necessarij.

RR Cultrorum acies.

TT Cultrorum manubria.

CHIRVRG. CVRT.
Icon Secunda.



ICONES.

Hæc tabula curtas nares, cutaneum traducem eductum, &
cuius aream indicat.

G D H Cutis propago educta.

H Propaginis apex.

G Radix eiusdem.

D Propaginis corpus.

A B F E Area cutis propaginis unde fuit abiuncta, & educta.

A' B' Terminus area superior.

F Terminus inferior area.

E Corpus area.

CHIRVRG. CVRT.

Icon Quinta.



I C O N E S.

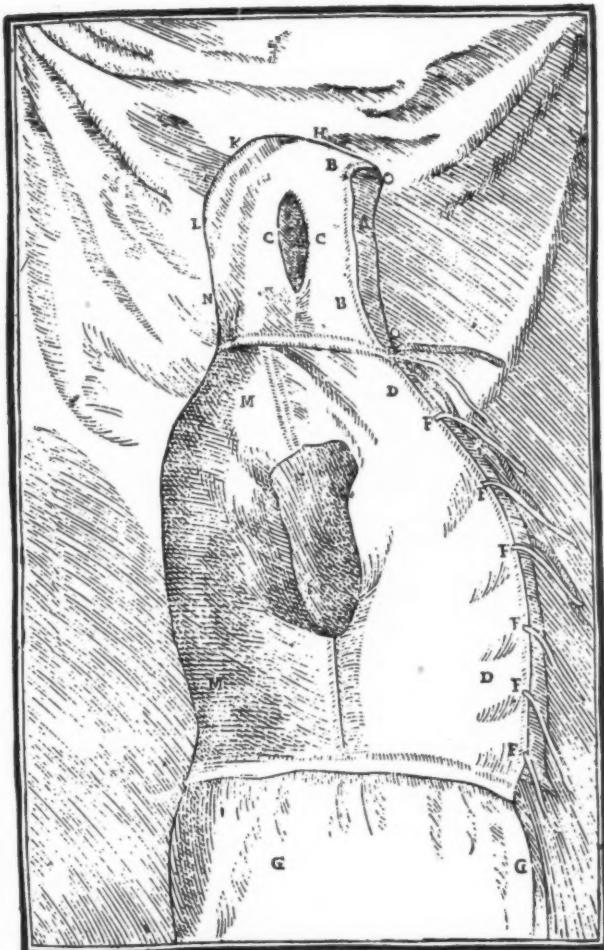
Hæc tabula vestitum vniuersum præter deligationis fascias
clarissimè demonstrat.

V L K H Cucullus.

- A Cuculli pars anterior, qua facies erit.*
- B B Cuculli pars dextra.*
- O O Cuculli pars sinistra.*
- C C Foramen, qua patet auribus exitus.*
- D D Thoracis, vel diploidis pars anterior.*
- M M Thoracis, vel diploidis posterior pars.*
- E E Locus qua brachia exerunt.*
- F F F Funiculi.*
- G G Cædiga.*

CHIRVRG. CVRT.

Icon Sexta.



ICONES.

Hæc tabula cum anticam, tum dextram partem deligationis ostendit.

<i>L</i>	<i>Cutanei traducis apex, ubi adest insitio.</i>
<i>I</i>	<i>Cutanei traducis radix.</i>
<i>NT</i>	<i>Areae valvus medicamentis obdulatum, & deligatum.</i>
<i>αω</i>	<i>Fascia regia.</i>
<i>DD</i>	<i>Fascia cubitalis.</i>
<i>CC</i>	<i>Fascia pectoralis.</i>
<i>M</i>	<i>Fascia brachialis.</i>
<i>BB</i>	<i>Fascia acicularis.</i>
<i>OO</i>	<i>Cucullus.</i>
<i>NN</i>	<i>Foramen auriculare cuculli.</i>
<i>GGGG</i>	<i>Thorax, siue diplois anterius.</i>
<i>HH</i>	<i>Thoracis disiunctio, infimul sincipitis coniuncta.</i>
<i>AAA</i>	<i>Funiebus, quorum opera fascia cum cucullo, vel diploidi coniunguntur.</i>

CHIRVRG. CVRT.
Icon Oclava.



ICONES.

Hæc tabula cutancum traducem rescissum indicat.

- A Cutaneus tradux ruditis adhuc & insonis illico ab ipsa re-
scissione.*
- B Cutanei traducis inseratio.*

CHIRVRG. CVRT.

Icon Decima.



XXXI.

EXAMINATION OF APPLICANTS FOR AVIATION
SERVICE, U. S. ARMY—DISQUALIFYING FAC-
TORS IN FIFTEEN HUNDRED CASES—SOME
OBSERVATIONS OF PAST-POINTING
AFTER ROTATION.*

By CAPTAIN W. A. SCRUTON, M. R. C.,
NEW YORK.

An impression has become very general that it is almost impossible to successfully pass the tests of the physical examining units established by the aviation section of the Signal Corps throughout the country, unless one is a sort of superman physically. This impression is absolutely erroneous. It has gained circulation through the exaggerated accounts of disqualified candidates and their friends. As a result of their malicious yarns, some men come to our examinations primed with false notions of what they are going to experience in the way of physical tests. They proceed to make friends with the Sergeant, and then guardedly and with apparent unconcern ask when they might expect the mallet test, or the pistol and needle test. The Sergeant, a nice, kind fellow, explains the whole process in detail, adding that special orders from Washington have recently added a few new tests for try out. If I suddenly approach an applicant after he has had such confidential inside information, he will break into a cold sweat and immediately have urgent business down the corridor.

Perhaps it is only proper that I should explain these mythical tests in detail. In the mallet test, the candidate is supposed to be led into a room alone with two examiners. He is seated at ease, while an examiner holding a stop watch, engages him in conversation. The second examiner is behind the chair, and cannot be observed. At the proper moment—that is, when the candidate is thoroughly calmed by conver-

*Read before the Section of Otology, New York Academy of Medicine, February 8, 1918.

sation—he is tapped on the head with a mallet, secundum artum at a nonvital spot. If he recovers consciousness in twenty seconds, he is normal. In the pistol and needle test the candidate is again seated at ease. He holds a needle between his thumb and forefinger, the point being against the forefinger and the head against the thumb. While he is engaged in conversation concerning his knowledge of pastoral pursuits, a pistol is suddenly discharged. If the needle pricks his finger and draws blood, he is disqualified as nervously unfit.

The physical requirements of the aviation section of the army are really in no way unduly severe or rigid. We are enjoined to obtain men with perfect aural mechanism, perfect vision, including normal ophthalmoscopic findings, excellent hearts and lungs, sound teeth, and no form of hernia. All other minor defects may be overlooked or waived. Certainly this standard is not too high, and no qualified person would think of suggesting that it be relaxed. Frequently rejected men tell me that the Canadian Royal Flying Corps will accept them. I know this to be true, as Captain MacDonald, C. R. F. C., has told me that he accepts men with 20/30 vision. It may be that we will eventually find it necessary to reduce our standard of physical requirement to conform with that of the aviation sections of other armies, but at present there does not seem to be a remote possibility of this occurring.

It would save considerable annoyance, and avoid mutual ruffling of tempers if physicians having patients who have been rejected by the New York unit would bear in mind that I do not personally set the standard. If a man has a spot of choroiditis, no matter what his vision is, he does not fly for the United States; the same also applies to slight defects in hearing. These matters generally seem to be of little consequence from the standpoint of successful flying, when one's personal patient is rejected. Remember, that if the condition is admitted as being present, the prescribed causes of disqualification cover the case absolutely. If the condition is not admitted as being present, I will always be glad to refer the doctor to the proper authorities for arranging a reexamination, when the opinions of the consultants of the unit would be available. There is no Board of Appeal. All cases are re-

ferred back to the original examining unit for reexamination.

Soon after taking charge of the New York unit last November, I realized that the profession was greatly interested to know how many men we were examining, the total number disqualified, and the number disqualified under subheadings in the the three different departments—eye, ear, nose and throat—and physical. As no data was at hand, it was necessary to arrange some method by which such tabulation could be carried and checked up daily so as to be available for immediate reference. After considerable experimenting, a card system was worked out along lines suggested by Sergeant Dana, who got the idea from some reports he had been required to keep at Camp Upton. The system was put into operation December 6th, and has proved quite satisfactory, save that we now see that some of the sub-headings could have been again divided to furnish more detailed information. Copies of the card of February 7th will be passed to each of you. This card is a record of flyers only; a separate card is kept for nonflyers, whose examination is the same as that given to any line officer, and will not be considered here.

The entire number of men examined from December 6th to date, flyers and nonflyers included, is 1,752. Eleven hundred and thirty-two of these were passed, and 620 were rejected. Considering the flyers alone, 1,364 were examined in this period; of these, 850 were accepted and 514 rejected. This makes 38 per cent rejections among the flyers.

Grand Total	Carried Over	Current	February 7, 1918
1364 { 850	837	13	Accepted.
514	505	9	Rejected
84	83	1	Stereoscope
6	6	---	Spontaneous Nystagmus
16	16	---	Ocular Movements
8	8	---	Visible Lesion
63	63	---	Color Vision
8	8	---	Hypophoria
11	11	---	Exophoria
12	12	---	Esophoria
170	165	5	Visual Acuity
34	34	---	Near Point
21	21	---	Vitrious Opacities
30	30	---	Opacities Lens

Grand Total	Carried Over	Current	
25	25	---	Choriditis
1	1	---	Retinitis
489	483	6	Nerve Head
12	12	---	Total Rejections, Eyes
86	86	---	Ear Drum
2	2	---	Hearing
11	11	---	External Canal
8	8	---	Ozena
8	8	---	Ethmoiditis
8	8	---	Static and Dynamic
8	8	---	Nystagmus Prolonged
8	8	---	Nystagmus Shortened
4	4	---	Marker Unequal Nys.
1	1	---	Falling
148	148	---	Total Ear, Nose, Throat, Rotation
133	130	3	Weight
12	12	---	Height
45	43	2	Chest Measurement
3	3	---	Respiratory System
23	22	1	Bones and Joints
17	17	---	Blood Pressure
55	55	---	Heart
19	19	---	Hernia
2	2	---	Hemorrhoids
10	9	1	G. U. System
3	3	---	Urinalysis
322	315	7	Total Physical

Additional rejections not recorded on the card:

Psoriasis, two cases.

Paresis of vocal cord, one case.

Pyorrhea, one case.

Unsound or absent teeth, four cases.

Thyroid enlargement, two cases.

Explanation of the Record Card.—It is marked in three columns, the first designated "Current," which gives the result of the day; the second, "Carried Over," gives the total result from the date when the system was established; the third, "Grand Total," which gives the total result of all examinations to date.

The rotation tests in the examination for aviation service have come into considerable prominence, due largely to the number of published magazine and newspaper articles, some

of them illustrated and all written as news items for public consumption. This test is the one most feared by the candidates: not understanding it, they feel that it is something developed with a special view to disqualifying a large number. As a matter of record in the New York unit, only twenty-one men out of 1,364 have been disqualified for failing to respond correctly to the rotation tests. The test is extremely important, as a normal balance mechanism is absolutely essential in aviation service.

Quoting from one of Major Jones papers, "The rotation test constitutes an objective measurement of the degree of function of the eighth nerve; we are not dependent on mere subjective impressions of the patient. Furthermore, if the Bárány tests show normal responses, they indicate not only normal labyrinth, but normal eighth nerves and normal vestibular pathways throughout the medulla oblongata, pons, six cerebellar peduncles, the cerebellum, and the pathways through both the cerebral crura to the cerebral cortex."

If these tests are carried through according to the prescribed directions, candidates rarely experience any unpleasant effects. Physicians when first taking up this work always furnish different returns in their results than they do when more experienced. Some examiners constantly have cases that cross-point or diverge in pointing. The result of their observation of the after-nystagmus following rotation is rarely equal in both directions of the rotation, because of inattention to prescribed detail.

I have never had a case of persistent cross-pointing or divergent pointing turned over to me for reexamination that did not point properly when care was exercised to maintain a correct position in the chair and rotate exactly ten times in ten seconds, stopping the rotation with considerable jolt. I would estimate that I have reexamined thirty or forty such cases. It has never been necessary to resort to the caloric test to clear up the unusual results occasionally returned by the examiners. I would say that nine out of ten cases should show an equal duration of after-nystagmus following rotation in either direction. The past-pointing will then take place an equal number of times with both arms to the right and to the left. If the after-nystagmus has been prolonged, the past-pointing will continue

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longer, and vice versa, which would respectively give higher or lower number of past-points.

The cause of cross-pointing and divergent pointing is absolutely an improper position of the head during rotation. At the present time there is not an entirely satisfactory chair manufactured for this type of work. I have knowledge, however, that promising experiments are in progress.

210 E. 64th St.

XXXII.

INFECTIONS OF THE PARANASAL SINUSES IN
INFANTS AND YOUNG CHILDREN, WITH
SPECIAL REFERENCE TO ADENOIDS AND
CHRONIC TONSILLITIS AS ETIOLOGIC
FACTORS.*

BY L. W. DEAN, M. D.,
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All pathologic work here reported was done by Dr. M. Armstrong. Dr. W. J. Foster assisted with the clinical observations.

Sinuitis in infants and young children presents many differences as compared with sinuitis in adults, from a diagnostic and therapeutic standpoint. The examination of the sinuses in this class of patients by some of the ordinary procedures used in the adult is quite out of the question. The probing and irrigation of the upper sinuses is especially difficult. The examination of the interior of the nose in any way further than by anterior rhinoscopy is very difficult. Because of such anatomical conditions as the smallness of the sinuses, and the thickness of their walls, the Highmorian antrum for instance, due to unerupted teeth, transillumination is not trustworthy.

The difficulty of investigating and diagnosing lesions of the sinuses in infants and young children, may perhaps be responsible for the opinion more or less current that such conditions are not common. The importance of the study of the sinuses in young children and infants, approaches that of its study in adults.

We believe that sinuitis in children two years of age or more is common. We also feel that it can produce just as deleterious results as sinuitis in the adult; and furthermore, that it may produce these results without presenting symptoms

*Candidate's thesis read before the American Laryngological Association.

which would be suggestive of its presence. It is possible for a child to have a suppurative discharge from the sinus into the nose which passes into the nasopharynx and is swallowed, and whose presence is not suspected. A much smaller discharge in an adult would give the usual history of a postnasal discharge. Even in an adult, occasionally the presence of diseased sinuses is overlooked. It is therefore not to be wondered at, in children, where the diagnosis is so much more difficult, that this condition is sometimes not discovered.

We were influenced to make a special study of this subject by the investigation of several cases of infective multiple arthritis, where the focus of infection was in the nasal sinuses and had been overlooked.

The first of these cases was a little girl eight years of age. She was referred to us for examination for the focus of infection causing her joint trouble. The examination showed chronically diseased tonsils, a small bunch of adenoids, and a slight anterior cervical adenitis. The mucous membrane of the nose was somewhat chronically inflamed. No free pus was found in the nose. The transillumination of the antra and frontals was negative. The X-ray of the sinuses gave no distinct blurring of any sinus. Several teeth were badly diseased and were removed. It was presumed that badly diseased tonsils and adenoids constituted the focus of infection.

On September 21, 1917, the tonsils and adenoids were removed; at the time of the operation each antrum was irrigated by inferior meatal puncture, and no pus was secured.

Some time after the removal of the tonsils and adenoids we received a letter from Dr. Byfield saying that since the removal of the tonsils and adenoids there was a slight but distinct improvement in the symptoms; that the pain was still present in the joints, and he felt because of the continuance of the acute joint symptom there was still a focus of infection which had not been reached. At this time the following joints were involved: Ankles, knees, elbows, the small joints of the hands and neck.

Upon receipt of this letter a second examination of the sinuses, not, however, including the puncture of the antrum, was carried out with a negative result so far as diagnosing any sinus disease was concerned. The gravity of the case, to-

gether with the probability of a focus of infection somewhere about the upper respiratory tract, led us to explore the various sinuses under general anesthesia. Each Highmorian antrum was operated upon through the inferior meatus; there was no pus in either antrum. The floor of the right antrum was covered with a much thickened and softened lining. The underlying bone in the floor had a superficial necrosis. Having found what was probably the focus of infection, the other sinuses were not opened. Pieces from the floor of the sinus were removed, examined, and the following is the pathologic report:

Chronic purulent inflammation of the lining wall of the antrum.

Gross Examination.—The specimen consists of a very small bit of bony tissue curetted from the antrum of Highmore.

Microscopic Examination.—The section contains small spicules of bone, surrounded by a loose connective tissue in which many fibroblasts, lymphocytes, plasma cells and polymorphonuclear cells can be seen. The blood vessel walls are thick, and near them is a round cell infiltration. No glands or epithelial tissue was found in the section, but the diagnosis of purulent inflammation was made because of the increase in fibroblasts, round cells and polymorphonuclear cells.

Note.—Here was a sinus that was negative on puncture, gave a negative X-ray picture; a sinus that contained no pus, but had in its floor a chronic purulent inflammation. The lining wall of the antrum had an underlying superficial necrosis. This was a condition meeting all of the qualifications of a focus of infection.

Two weeks following the operation Dr. Byfield reported that the acute pain in the patient's joints had entirely left her; some joints were markedly decreased in size. We felt that the focus of infection for the joints had been found. Further progress of the case proved this to our satisfaction.

Unfortunately, when the focus of infection is in the paranasal sinuses, as a rule we do not get the sudden and remarkable improvement following the operation upon the sinus that we get when the focus is in the tooth or tonsil. When we operate upon a diseased tooth or tonsil the offending organ is cut out and thrown away. The best we can do with a sinus

is to thoroughly drain and clean it out, and remove necrotic bone from its walls; with the very best of treatment a purulent discharge will occasionally persist for a long time, and after it has disappeared, will recur, the secondary manifestation disappearing and reappearing with the disappearance and reappearance of the pus. The proper treatment of such cases we will take up later.

A second case was to us even more instructive. This patient, a boy ten years of age, came into our service on January 17, 1917, with an acute suppurative otitis; at this time he had a multiple arthritis.

An examination of the nose, throat and teeth was carefully made. The examination was negative except for chronic tonsillitis and adenoids; these were thought to be the focus of infection and were removed. Two months later the patient had an acute exacerbation of his arthritis, and was referred to us again for examination. A second complete examination of the sinuses was made, including anterior rhinoscopy, antrum puncture, transillumination and X-ray examination. The only indication of sinus disease was a slight discharge in the upper posterior nasal cavity. A negative report is so far as the sinuses was concerned was returned.

Four months later I received a communication from Dr. Steindler saying that practically all of the joints except those of the spinal column were involved; that there was a focus of infection somewhere, and if it were not found all joints, including those of the spinal column, would soon be ridged and the child would be utterly helpless.

A third examination was made, and the findings were the same as before. It was decided to make an exploratory opening of the various sinuses.

The right side was operated upon first. Neither antrum, frontal or posterior ethmoidal sinuses were diseased; an anterior ethmoidal cell was found to contain pus. Soon after, the sinuses on the left side were explored; both the anterior and posterior ethmoids contained pus. There was also a very small amount of purulent material in the Highmorian antrum. In each side of the nose from the diseased sinuses a hemolytic streptococcus was secured.

Two weeks after the operation a letter was received from

Dr. Steindler saying that the patient had had a constant progressive improvement since the drainage of these sinuses.

We realize that chronic tonsillitis and adenoids are far more commonly the focus of infection in multiple arthritis in children than is suppurative sinuitis. Since our experience with these two cases we have never expressed the opinion, when asked to find the focus of infection in a child, that diseased tonsils and adenoids constituted the only probable focus in the upper respiratory tract. In such patients with chronic tonsillitis and adenoids, where the examination of the sinuses is negative, we always ask for the return of the patient for further examination, if, after the removal of the tonsils and adenoids, acute symptoms suggestive of continued infection persist. We believe that exploratory opening of the sinuses in children in severe cases of systemic infection is indicated, providing there is no other focus of infection found. Only do we believe such exploratory openings to be contraindicated when the nose is perfectly free from discharge, and the mucous membrane of the nose is normal. Such a condition should exclude sinuitis. The absence of pus in the sinuses does not exclude them as being foci of infection.

We are also of the opinion that in every child where, following the removal of diseased tonsils and adenoids, the parents are not satisfied with the improvement in the child's condition, an examination of the paranasal sinuses is indicated.

Coffin,¹ one of the pioneers of America, gives as the symptoms of sinuitis in children persistent discharge from the nose, repeated colds, intermittent stoppage of the nostrils, reflex cough, pain in head, an unaccounted for range of temperature, and anemia. He says the diagnosis is made by finding purulent or catarrhal secretion in the nose or nasopharynx, cleansing, using the suction and finding it again.

Wood² gives a most excellent description of the pathology of sinuitis in children. He says the difference between sinuitis in children and adults is due to two anatomic facts:

1. In childhood the sinuses are in an undeveloped state.
2. The surrounding bone is softer, with diploe—hence it is more open to extensive involvement.

He concludes that involvement in the early years of life is

less frequent and only seldom chronic; that when it does occur the destructive lesion of bone is more frequent.

He says that in a maxillary sinuitis the mucous membrane may become so edematous as to fill the cavity. This we have noted in an X-ray examination and the finding has been confirmed on operation. Later in this paper the pathology of such a thickened membrane is described.

He further says that chronic sinuitis may be cured by hyperplastic tissue becoming sclerosed and filling the cavity with fibrous tissue.

Coakley³ concludes:

1. Sinuitis in children is as common as in the adult.
2. Because of shallow cavities it has a greater tendency to spontaneous cure.
3. He concludes that in a child without adenoids, and with a profuse nasal discharge, the patient has sinuitis. Our observations show that a large percentage of cases with adenoids have chronic sinuitis.

He is an advocate of nonoperative treatment, suction, cleansing the nose, diet, and attention to the general health.

Mosher⁴ has given us some very practical points in connection with this subject. He says that the sphenoid in children is larger than we ordinarily expect it to be. In a boy of twelve he has found one of adult dimensions. We have seen such a sinus in a boy nine years of age. Warren Davis, in his specimens, showed me two cases of complete bony sphenoids at birth.

Mosher⁴ also says that from the third year on the antrum is large enough for surgical treatment. We have had several cases under two years of age where it seemed to be advisable to operate upon the antra. In one case eleven months old it was necessary to drain the antra.

A statement, which I believe to be original with Mosher, I think should be the basis of all of our clinical observations on the sinuses of children: "Precocious development of the sinuses may make any or all sinuses of surgical size earlier in life than we expect."

Casselberry⁵ feels that a certain class of chronic sinuitis in children requires conservative intranasal operation.

Myles⁶ thinks that intranasal operations in children is more frequently indicated than is done at this time.

Oppenheimer⁷ calls attention to the fact that at birth we may have antral sinuitis from injury (forceps) or infection from vaginal discharge.

Emil Mayer,⁸ in one of the earliest articles in American literature on this subject, concludes that the apparent rarity of sinus disease in children is due to difficulty in diagnosis.

Killian⁹ and Hubbard¹⁰ have discussed the question of sinuitis and infectious diseases.

Haike¹¹ gives a most excellent description of radiography of sinuses in children. He finds the antrum most often diseased; next to the antrum, the ethmoids.

Skillern¹² considers all sinuitis under the age of five as an ethmoiditis or as an osseous infection.

In this investigation of sinuitis in children we have confined ourselves to a study of those latent cases of chronic sinuitis which are so apt to be foci of systemic infection. We have not included cases with marked local complications due to osteomyelitis. These complications are more common with infections of the upper sinuses than with the Highmorian antra; although in our latent cases of antral sinuitis it was common to find sinuitis with necrosis of the floor without, however, external manifestations of such an involvement. We have also excluded cases due to recent acute infectious diseases or to syphilis; ozena cases were not considered. In every case of sinuitis studied, syphilis was excluded in so far as the Wassermann test would exclude it. In some of the more severe cases the same test was applied to the parents.

The production of superficial abscesses about the orbits and the discharge of the pieces of bone from these abscesses is much more common in sinuitis in children than in adults. This is due to the bone surrounding the sinuses being more cancellous in the child. In our investigations we have found so few cases of chronic sinuitis with this complication as compared with the rather large number without the complication, that we feel this should not be considered as one of the important diagnostic points for sinuitis in children.

We feel from a review of our cases that anatomic knowledge of the average size which any sinus should have at a certain

age is not so important, considering the fact that there may be a precocious development of any sinus so that it might be a surgical sinus much sooner than one would expect.

Ordinarily, we may expect that under the age of two years we are only dealing with the ethmoidal labyrinth; that the sphenoidal sinus developing as it does from the posterior superior lateral angle of the nasal fossæ, may be considered, so far as its diagnosis, symptoms and treatment is concerned, as an ethmoidal cell; that the frontal sinus not having extended into the frontal bone, may be viewed in the same way. Exceptionally, there may be a precocious development of the sphenoid, so that at birth there is a true bony sinus, separate and distinct from the ethmoidal mass. A study of the excellent collection of specimens of Dr. Warren B. Davis shows a true bony sphenoidal cell present at birth, and a true frontal sinus before the age of two.

Dr. Warren B. Davis tells me that we may ordinarily expect the sphenoidal sinus to be large enough at the age of five years so that sphenoidal infections might involve the second branch of the fifth, and that at this age the floor is usually descended low enough to approach the vidian. He reminds us that in a precocious sphenoid, the nerves mentioned may be involved very much earlier.

Sluder,¹³ from a study of Davis' specimens, concludes that the sphenoidal sinus may be separated by only an eggshell thickness from the second branch of the fifth nerve at the age of three years, and from the vidian at the age of five years.

The relation between the involvement of the sinuses and the sphenopalatine neuralgia, so well described by Sluder,¹³ applies to children as well as adults. The examination of sinuses in children with headache is indicated just as much as the examination of the sinuses in adults with a similar condition. We are never safe in assuming, without having before us at least the X-ray plate of the patient, that the size of the various sinuses is not large enough to produce headache if they are diseased.

The relation between sinuitis and systemic disease in children is very intimate. We have seen nephritis, cardiac lesions, pernicious vomiting, headache, asthma, arthritis, pulmonary lesions, chorea, hay fever, recurring coryza, neurotrophic dis-

turbance, laryngitis, mild systemic sepsis, persistent fever, relieved by the treatment of sinus disease. I do not think we should be guilty of the common error and even suggest that we have found a panacea for all these ills.

All of these cases mentioned are patients who have been studied by a pediatrician and by myself, where a distinct relation between the sinuitis and the disease was found. It goes without saying there have been many more cases similar to these that have not had any sinuitis. Because of the occasional relationship between the conditions mentioned and the sinuitis we feel that the sinuses should be carefully looked into from the etiologic standpoint in all such cases when the etiologic factor is not plain. All such cases should be studied by the head specialist and the pediatrician together.

Such a working arrangement we have found to be absolutely essential; in short, most of our very interesting cases are those who have been referred to us by the pediatrician for examination of the sinuses.

The relation between sinuitis and pulmonary conditions is very definite. Naturally, purulent infections of the upper respiratory tract would exert an influence upon the lower respiratory tract. The following are the opinions held by Dr. Scarborough regarding the relationship between infections of the upper respiratory tract and pulmonary lesions:

The infections of the respiratory tract, sinuitis, adenoids and diseased tonsils are a part of the vicious circle in pulmonary tuberculosis. These infections in children have a deleterious action upon the lungs just the same as poor hygienic surroundings, poor food or overwork. The removal of these infections has a similar beneficial influence as the removal of any of the other conditions mentioned. Sometimes the removal of tonsils and adenoids, or the relief of sinuitis, result in an apparent cure of the pulmonary lesion. The cure is really due to the organism having only one infection to combat rather than two.

Since July 1, 1917, we have studied the sinuses of two hundred and thirty-four children suffering from adenoids who have come into our service, and in those cases referred to us by Drs. Byfield, Steindler, Scarborough and others, to ascertain, if possible, the cause of some systemic disturbance. As

these observations have been made only since July 1 last, in many cases the study has not yet been completed.

We have been surprised at the results of our investigations of sinuses in children suffering from adenoids and chronic tonsillitis. Two hundred and thirty-four children, thirteen years of age or younger, with adenoids were examined; many of them also had chronic tonsillitis. The examination consisted of an anterior rhinoscopy followed by radiography. When sinus trouble was even suggested by the X-ray plates, a more complete examination was carried out. In thirty-four out of two hundred and thirty-four children, or in about fifteen per cent of the cases, a chronic empyema of one or more sinuses was found. In every case where a diagnosis of chronic empyema was made, a Wassermann test was applied and, if positive, that case was excluded from our list. None of the thirty-four cases mentioned above had a positive Wassermann.

We have been led to believe by a study of sinuitis where the adenoids and tonsils had been removed for some time and a persistent sinuitis was present, that the increase in adenoid tissue, sometimes referred to as compensatory tissue which is so frequently noted in the pharynx and nasopharynx following adenoidectomy and tonsillectomy, was the result of infection from these sinuses. In every case where we have noted the presence of this adenoid tissue a chronic sinuitis had been present. All cases of chronic sinuitis have not, however, had this increased adenoid tissue in the pharynx.

We will divide the study of our cases into the following subdivisions:

1. Pathology.
2. Diagnosis. This we will divide into
 - (a) History.
 - (b) Presence of nasal and postnasal discharge.
 - (c) Condition of the mucous membrane of the nose.
 - (d) X-ray examination.
 - (e) Examination with the nasopharyngoscope.
 - (f) Puncture and irrigation of the Highmorian antra, and exploratory opening of the other sinuses.
3. Treatment:
 - (a) Nonoperative.
 - (b) Operative.

(c) Postoperative.

4. Results:

Pathology.—A survey of the literature shows that very little has been written upon the microscopic findings in sinusitis of children. With the exception of one very excellent article by Wood,¹⁴ no one seems to have dealt directly with this subject. There are probably two reasons for this: First, the pediatricians and even the rhinologists have not recognized the probability of finding sinusitis in children, and second, because it has not been pointed out that there is an essential difference between the histologic findings in children and in adults.

Wood, however, in the article just referred to, mentions one point of difference which seems worthy of further study. The bones in early childhood are softer and more easily attacked than in the adult. Our observations tend to establish the fact that in cases of equal clinical severity and with equally marked changes in the mucous membrane, there is much more apt to be an involvement of the underlying bony wall in the child than in the adult.

The findings in the case of F. R., age eight years, will serve as an example. The antrum was practically empty, containing only a small amount of mucous. A small bit of tissue removed from the floor of the antrum at the time of operation and prepared for microscopic examination gave a typical picture of granulating ostitis. This question of bone involvement is one of great importance.

Zuckerkandl¹⁵ makes the statement that he has never observed bone caries as a result of an empyema. Where he finds an empyema accompanied by necrosis or disease of the bone he takes the position that the bone caries existed and is the cause of the empyema. Grünwald,¹⁶ on the other hand, takes the position that the empyema usually exists first and that the bone necrosis is secondary to it.

Hajek¹⁷ states that an acute empyema may end in three ways: There may be complete restoration of the tissue; the process may become chronic; or there may be an ulceration of the mucous membrane with caries of the underlying bone and the formation of abscess with or without a fistulous opening. The latter condition is, he says, seldom seen and then

only following the most severe infections. In the footnote he adds that Zuckerkandl and E. Frankel have not seen such a condition. Dmochowsky speaks of it as a not infrequent ending.

Under "unusual pathologic complications or sequelæ of chronic inflammation," Skillern¹⁸ mentions new formation and ulceration of bone, caries, and necrosis. Concerning ulceration of bone, he says: "The condition seems to be dependent upon an especially virulent infection, being always accompanied by ulceration of the superimposed mucous membrane. Actual destruction of the osseous wall is relatively rare."

These authors dealt very largely with sinusitis in adults. It is more than probable that had their observations been confined to sinusitis in children, bone involvement would have been noted far more frequently.

In children it is probable that the primary infection is usually overlooked, and it is, as a rule, only those cases where there is destruction of bone and subsequent spreading of the inflammation to the soft tissues of the face that come to the notice of the physician.

All of our cases have been of the chronic latent type. In only this particular, the high percentage of cases of periostitis and inflammation of bone, have they differed from the classical description given by Dmochowsky and followed by Hajek and many other writers.

The membrane is thickened, due to an increase in the fibrous tissue elements, especially in the form of young fibroblasts, and to an edematous infiltration into the connective tissue interspaces. The basement membrane is usually very prominent, and in the upper portion of the connective tissue there is a more or less marked cellular infiltration. The majority of these cells are lymphocytes. Plasma cells, polymorphonuclear neutrophile leukocytes and eosinophiles are occasionally seen. This infiltration is especially marked just below the basement membrane. The mucous glands when present often show signs of increased activity, as indicated by enlarged cells containing globules of mucus. Round cell infiltration and fibrous connective tissue thickening are often very prominent about them. The epithelial layer varies in structure from the normal ciliated columnar epithelium to a stratified, cuboidal

epithelium, very closely resembling the stratified squamous in type.

Frequently the epithelium is very largely desquamated, leaving the basement membrane bare or sparsely covered with a few ragged cuboidal cells. When the epithelium is columnar in type, many beaker cells are seen along the surface. Lymphocytes and polymorphonuclear leukocytes are often seen infiltrating the epithelial layer and lying upon the surface. Several instances have been observed where the superficial layer of the mucous membrane has been replaced by granulation tissue.

History.—Perhaps the most common symptom in our cases of sinuitis has been sneezing; other prominent symptoms are recurrent stoppage of the nose, frequent colds, discharge and headaches. The history of postnasal discharge so common in the adult is conspicuous by its absence.

Nasal and Postnasal Discharge.—The finding of mucopurulent discharge in the nose anteriorly or in the nasopharynx is always very suggestive of sinuitis.

The Condition of the Mucous Membrane of the Nose.—A dark red, thickened, boggy mucous membrane or enlarged, boggy turbinates are suggestive of sinuitis. We have never found sinus disease present in the nose of a child free from pus and with a normal mucous membrane. We have found present a slight amount of discharge with diseased mucous membrane where we have been unable to find sinus disease. We are inclined to feel that these cases have had sinus disease which could not be located.

The first step in our examination for sinuitis is to note the condition of the mucous membrane of the nose and the presence or absence of discharge. In our earlier studies transillumination was used as a diagnostic method. We still use it in children over eight years of age. In children under eight years of age the transillumination of the frontals has been very misleading. The very thickened floor of the antrum with the unerupted teeth interferes with the transillumination of these sinuses.

X-ray Examination.—Immediately following the examination of the nose by anterior rhinoscopy, an anteroposterior and lateral X-ray picture is taken. It is much more difficult to get a satisfactory X-ray picture of sinuses in children than in

adults. The children are unruly, and with infants and young children it is necessary to administer an anesthetic. Even with the child anesthetized, the difficulties are greater. The outlines of the sinuses in children are not so distinct as in the adult, because the bone surrounding the sinuses is cancellous, consequently soft, and does not give the distinct outline to the sinus which we get with the hardened bone of the adult. Nevertheless, the X-ray picture of the infant plays a much more important part in the diagnosis of sinus disease than in the adult. In the infant and child, we are not safe in assuming from our anatomic knowledge, that any sinus is or is not a surgical one. One X-ray picture gives to us this definite information. The information regarding the size of the sinus is a very important step in the clinical diagnosis. If there are no sinuses, or if they are too small to be surgical, our minds are relieved; if the sinuses are large, then we must find out whether or not they are diseased.

In infancy and later until the frontal sinus invades the horizontal plate of the frontal bone, the picture of the frontal sinus is confused with that of the ethmoids. As soon as the sinus extends into the horizontal plate of the frontal, then the X-ray picture distinguishes it from the ethmoids and it can be separately diagnosed. Such a picture we have found present at the age of two years. Haire says that at the age of five years twenty-five per cent of the children have the frontals distinguishable in the X-ray plate. The ethmoidal sinuses show particularly plain in children, at least compared with other sinuses.

Valuable information, even in infants just a few months old, can be secured regarding the Highmorian sinuses in connection with their location, size, and as to whether or not the floor of the sinus extends below the inferior turbinate. Disease of the sinus is usually diagnosed. We have found marked diseased Highmorian sinuses in an infant eleven months old. This case was operated upon. The antra were filled with thick white pus. The patient had a posterior cleft. It was advisable to eradicate the sinus disease before closing the cleft. In this case two streams of pus could be seen flowing down on the posterior wall of the pharynx; the ethmoids were also diseased. The patient had a negative Wassermann. We have

had two other cases under the age of two years, where it seemed advisable to operate upon these sinuses. We have noted in the X-ray plates of the antra of children what seemed to be a fluffy mass. Such sinuses we have found to be almost filled with a very thickened edematous membrane, the pathology of which is as follows:

The microscopic section shows a tissue four to eight times as thick as the normal mucous membrane. The connective tissue is increased in amount, and has wide interspaces which may be filled with a homogeneous, faintly pink staining material. The mucous glands are increased in size, the acini are often distended with mucus. The upper layer of the connective tissue is more or less infiltrated with cellular elements, the majority of which are lymphocytes; a few plasma cells and eosinophiles, and sometimes polymorphonuclear cells, are present. The basement membrane is usually very prominent. The epithelial covering may be normal in appearance or may be composed of stratified cuboidal cells.

The X-ray Examination of the Sphenoid.—The sphenoid sinus is so covered with bone, in young children and infants, that I doubt if its diseased condition can even be definitely diagnosed from the X-ray plate. We may, however, determine whether or not it is present, and approximately its size, the most important thing. We have also felt that a clear sphenoid picture excluded sinus disease and that we secured definite negative information.

In one case, a girl fourteen years of age, who came under our observation, we wrongly interpreted the sphenoid shadow. The sphenoid was exceedingly large, and was clear. The examination with the nasopharyngoscope, however, revealed pus coming from its ostium. Operation upon the sphenoid revealed a very large cell, badly diseased.

A blurred sphenoid may be so because of overlying bone and is not necessarily positive for a diseased sinus.

The examination of the middle and superior meatus of the nose in young children and infants, with the nasopharyngoscope, presents several difficulties. It is very difficult to hold the child's head quiet; the mucous membrane is very delicate and bleeds easily with a resultant blurred field. We have tried using adrenalin in the nose before making the examination

and, while adrenalin spoils the typical picture, we have felt that we secured the best information after its use, because we avoided hemorrhage and could get a fairly good view.

When a general anesthetic was administered for the removal of tonsils and adenoids, or for the taking of an X-ray picture, we have tried to use the nasopharyngoscope; we use only ether for anesthetic, and it soon fills the nose with mucous, which has interfered with a successful examination.

Notwithstanding the difficulties in using the nasopharyngoscope in this class of patients, we have found it a most important aid in the diagnosis of sphenoidal and posterior ethmoidal disease.

In one case, eleven years of age, sphenoid trouble was diagnosed on one side and absent on the other, the diagnosis being confirmed on the operating table.

Diagnostic Puncture and Irrigation of the Highmorian Antra and Exploratory Opening of the Other Cells.—Puncture of the antrum of Highmore in infants and young children is a routine procedure with us with our patients suffering from adenoids, where the X-ray picture is suggestive of Highmorian sinus disease. The puncture is made at the time of the adenoid operation. If reasonable care is exercised we do not feel there is danger of puncturing the orbit, going through the outer wall of the antrum or of injecting fluid in the cancellous structure of the bone. In all of our cases where puncture has been made, we have had before us an X-ray picture showing the location of the sinus. In every case we have had, the antrum could be punctured by inserting the needle upwards from the inferior meatus.

A study of Warren Davis' specimens shows that in all of them the antrum may be entered from the inferior meatus. If an antrum should be so highly located that this could not be done, the X-ray picture would reveal the fact.

Since July 1 last, we have punctured one hundred and forty antra in children and have not had any bad results. The pus comes from the antrum in a small mass, and we do not believe it can be confused in any way with the discharge that may be left in the nose after it is cleansed, even in young children. The presence of pus in the antra has made a positive diagnosis.

In cases where we thought there might be a simple drainage of pus into the Highmorian sinus, the lining of the sinus has been examined and found diseased. Usually there was bone involvement in the floor of the sinus. The absence of pus does not exclude sinus disease. With no pus, there may be diseased membrane, and underneath it necrotic bone.

Treatment.—Nonoperative: We have not had opportunity of pursuing the nonoperative treatment as far as we would like. Naturally, only those patients were operated upon, where irrigation of the sinus together with the removal of the post-nasal obstruction, did not bring about a cure. Our patients were charity cases living far from the hospital, and relief must be secured in a minimum amount of time. In many of the cases the sinuses were foci of systemic infection, and it was advisable to hasten the cure as much as possible.

Operative.—The operative treatment we have divided into two classes:

- (a) Removal of the cause of sinuitis.
- (b) The operation upon the sinuses themselves.

In none of the young children or infants studied have we found deflected septa or exostoses that we thought could be responsible for the sinuitis.

From our series of cases with adenoids, most of them having diseased tonsils, we found thirty-four cases having suppurative sinuitis. Of the thirty-four cases of sinuitis in children with adenoids, thirteen had a history of having previously had an acute infectious disease. So many of these patients became well after the removal of the tonsils and adenoids that we felt the acute infectious disease was not a very important etiologic factor.

In some of Warren Davis' specimens I noted that large bunches of adenoids extended from the nasopharynx downward and forward so far as to form, with the roof of the nose, an angle of about sixty degrees. Such a condition is naturally the best kind of a trap for the collection of secretion which is driven backwards in the nose to the nasopharynx. Adenoids in this way may keep in the upper posterior part of the nose constantly a mass of secretion which, being stagnant, would soon become mucopurulent. This is one of the ways in which adenoids may cause sinuitis.

In three cases of bony posterior atresia of the nares, two had pansinuitis on the side occluded. I have recently had the opportunity, through the courtesy of Dr. Prentiss, of examining a beautiful case of complete bilateral bony anterior atresia in an adult. The specimen was found in the anatomic laboratory. The sinuses were perfectly developed and normal; quite different from my findings in posterior atresia.

In all of our cases of chronic sinuitis here related, when the sinus disease was not acting as a focus of systemic infection, the treatment has been the removal of the tonsils and adenoids without any after-treatment whatsoever. We have them wait five or six weeks, and then make a second examination. These cases have only been studied during the last six months, and many have not returned as yet for examination. A later report will be more comprehensive. Of seven cases where chronic suppurative sinuitis accompanied adenoids and diseased tonsils, five patients on return several weeks after the removal of the tonsils and adenoids, were found to be apparently well. So in children as in adults, the main thing in the treatment of chronic sinuitis is the removal of the cause. The operative procedures we have used are as follows:

Position.—In operating on the antra, the patient lies on his back, and the pharynx is kept clean with the suction apparatus. In operating on the frontal, ethmoids, and sphenoids, the same position is used, but two pieces of suction apparatus are necessary: one to keep the pharynx and nasopharynx clean; the other, with a nasal attachment, is used for cleansing the interior of the nose. Even in very young children this gives us a very clear field. For the sphenoidal, ethmoidal, and frontal sinuses, we use very small curettes to break down and cleanse the cavities. Sluder's operation gives excellent results. In most of our cases we have operated only upon the Highmorian antra, the upper nasal sinuses being treated by suction after the operation.

We have never performed an operation through the canine fossa in young children or infants. We never expect to do such an operation, because of the injury to unerupted teeth. Except in two cases, all operations upon the Highmorian antra were performed without loss of turbinate tissue. In two infants it was necessary to remove a very small piece from the

anterior end of the inferior turbinate bone. Our procedure for intranasal drainage of the antra is as follows:

Using a pair of blunt Knight's forceps, the whole of the inferior turbinate is rotated outwards and upwards. After this rotation is complete, the inferior margin of the turbinate points up and out. This gives us just as good an exposure of the inferior meatus as the removal of the inferior turbinate. After the operation is completed, the inferior turbinate is replaced, and retains its original position without any apparent ill effect whatever from having been turned upward. The turbinate is elastic. There is no noticeable fracturing of the turbinate when this is done.

The size and location of the antrum and the position of its floor are accurately determined from the X-ray picture. After the turbinate is turned up and out, an opening is made through the inferior meatal wall; hypertrophied and necrotic areas within the antrum are curetted, the floor being specially examined for such conditions. The opening in the inferior meatus remains open usually long enough for healing; if it closes it is readily reopened. Eventually, the meatal opening always closes, and as a final result we have the nose apparently intact and normal.

In infants about one year old, in draining the antra, one finger is placed in the orbit. A very small curette enters the antrum above the middle turbinate. The curette can be felt by the finger in the orbit, when it strikes the very elastic wall of the sinus. The ethmoids are removed with a ring curette.

Postoperative Treatment.—Suction, irrigation of the nose with salt water, followed by some oily spray, is our routine treatment in all cases. If the antrum is operated upon, it is irrigated daily with argyrol; if this is not sufficient, five per cent silver nitrate is used. The suction treatment has been used, even with infants. The best postoperative treatment is plenty of sunshine and out of door life. In the late fall, winter and spring it is best if the patient can go to a climate with abundance of sunshine and warm air. Many of our patients are not able to do this, and a long course of postoperative treatment is necessary.

Results.—With the exception of two cases, the result has been good. In two cases, after weeks of treatment, pus re-

appears as soon as the treatment is discontinued. The cases in this series, however, have all been studied since July 1 last, and the fact that the sinuses at this time are apparently well does not mean they are permanently cured. The following are some of the interesting things noted in our work:

It is not uncommon in removing tonsils and adenoids or operating on the sinuses in children, with joint infections, to have the joint trouble made more acute, accompanied by a rise of temperature. These results we have assumed to be due to local manipulations of the focus, resulting in increased systemic infection; this we believe is not always the case. In two cases of acute multiple arthritis, when there was a persistent sinuitis after operation and it was necessary to use silver nitrate, etc., it was found that following each treatment there was a rise in temperature; cessation of the treatments prevented these excursions. The treatments were given again, great care being used not to traumatize the joints, without any rise of temperature whatever. Our conclusion is that in operating on cases with arthritis the greatest care should be exercised not to traumatize the joints.

In cases of severe systemic infection and inability to localize the focus of infection, an exploratory operation of the sinuses, especially the ethmoids, is indicated unless the complete absence of discharge in the nose, perfectly normal turbinates and mucous membrane contraindicates sinuitis. In the adult, sphenoidal disease cannot positively be excluded except by opening the sphenoids; in children, the same is true of the ethmoids.

The following are a few cases which present points of interest:

Baby B. A., age sixteen months. This baby was in the pediatric service with a diagnosis of unresolved pneumonia. The patient was referred to us for examination because of a very purulent discharge from the nose. Adenoids were present. The Wassermann examination was negative. Owing to the patient's condition, an X-ray examination was not advisable. Diagnosis, adenoids. Two weeks later the baby died. The autopsy revealed frontal sinuses absent, the ethmoid cells filled with polypoid membrane and bathed in pus. The sphenoidal sinus was very minute, with no macroscopic evidence of disease. The antra contained no pus or other fluid. This

was one of the earlier cases, and it was assumed that the adenoids were responsible for the nasal discharge. The true suppurative condition was revealed only at autopsy.

Baby L. O., age nineteen months. Referred by the department of pediatrics for examination of the nose. The diagnosis was neurotrophic disturbance; the condition of the child was quite critical. Our diagnosis was suppurative ethmoiditis, Highmorian sinuitis, and probably sphenoiditis. No adenoids were present. The Wassermann was negative. All of the diseased sinuses were drained. The sinuitis would disappear with postoperative treatment, and reappear with the stoppage of the treatments. We were informed by the pediatrician that the benefit to the general condition from the treatment of the sinuitis was eminently satisfactory.

I. H., age seven years. This is such an interesting case that I take the liberty of reporting the history in full.

The patient came in our service December 13, 1917. Since one year of age he has had a tendency to develop a temperature of 101 without apparent cause; more noticeable when he has a cold, but is present when he does not have one. Last spring the tonsils and adenoids were removed. Since then there has been quite an improvement in this elevation of temperature. He was referred to us by Dr. Scarborough and Dr. Byfield for examination. Intracutaneous tests for tuberculosis were positive; other tests were negative; chronic bronchitis as a very old process.

We found chronic bilateral pansinuitis with a marked cervical adenitis.

December 15, 1917. Treatment.—Drainage of all of the sinuses, followed by suction and irrigation.

The following abstract from Dr. Byfield's history was taken on December 21, 1917:

Has had attacks of fever with respiratory infection and enteritis since one year of age; only two attacks since the removal of the tonsils and adenoids in May, 1917. For many years chronic nasal discharge which has had a tendency to become purulent. The patient has had in the last few months a very irregular temperature; sometimes going to 102 without evidence on the part of the patient. Lungs: Numerous râles

which improved very much within five days following the drainage of the sinuses.

Under the date of January 15, 1918, just one month following the operation, we received a letter from the boy's father saying that since the operation there had been no fever.

This case is mentioned only as a patient very incompletely observed. It would be very difficult for us to conceive with the postoperative history today, that the disease of the sinuses was not exerting a decided influence upon the condition of the patient. It will be interesting to observe the future progress of the pulmonary condition and temperature.

CONCLUSIONS.

1. Sinuitis in young children is not rare.
2. Where there seems to be a focus of infection in the upper respiratory passages causing a systemic disease, and the removal of tonsils and adenoids does not check the acute process, the sinuses must be very carefully examined.
3. Adenoids are a very common cause of sinus disease. Their removal usually causes a cure.
4. In arthritis cases, increased joint trouble following operation on the nose and throat is not always due to increased infection, but may be due to traumatizing the joints.
5. Intranasal drainage of the Highmorian antra may be done in infants and young children without injury to turbinate tissue.

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XXXIII.

ADENOCARCINOMA OF THE NOSE. REPORT OF FOUR CASES.

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NEW YORK.

Adenocarcinoma of the nose is rare enough to warrant reporting each case.

From clinical or microscopic findings, it is hardly possible in the early stages to determine whether the growth is of a benign or malignant character, and I should urge that all such growths be looked upon as of low grade malignancy.

Dr. Jonathan Wright, dean of rhinologic and laryngologic pathology, has fully discussed this subject,^{1 2 3} and I have had the good fortune to have him examine all the specimens from these four cases.

From a feeling of triumph in surgery to one of humility, I report the subsequent history of Case 1, previously reported in the ANNALS OF OTOLGY, RHINOLOGY AND LARYNGOLOGY of June, 1907. ("Adenocarcinoma, Situated in the Right Maxillary Antrum, One Year and a Half After Operation.")

Case 1.—C. F., aged fifty-nine years, United States; occupation, milkman. Previous history, negative. First seen on December 6, 1905, when he gave the following history:

Twelve to fourteen months before, he began to notice swelling of the face and hard palate. For the past ten years, he says, he has had a small swelling on the alveolar process. The teeth on that side fell out about five years ago, also some on the opposite side. The subjective symptom which the growth gave was nasal obstruction. The growth, where it had broken through the bone, had a cystic feel. The swelling in the mouth has obliterated the usual landmarks, and was one smooth swelling from the gingivobial fold well beyond the median line, involving the alveolar process as far as the left canine tooth. The anterior surface of the growth bulged the cheek markedly on that side and overrode the intraorbital

ridge and the nasal bone. The nasoantral wall bulged into the nose, and pushed the septum over until it touched the opposite side. The growth had caused absorption of the bone in several directions, namely, the anterior and inferior antral walls, and probably the nasal walls. His heart and lungs were normal, kidneys slightly congested. He had been a steady whisky drinker for years, averaging about ten drinks daily.

The superior maxilla was excised in toto. The gross section of the specimen showed a mass, creamy yellow in color, granular, not vascular, the consistency of the spleen.

The growth was submitted to Dr. Jonathan Wright for examination, who reported as follows:

"This growth is an adenoma. The interest, both clinically and histologically, is whether we are to consider it malignant or benign. In many places, the type is one of simple row formation, run wild, but not clustered into irregular clumps of cells, which in this kind of case I have been accustomed to associate with malignancy. In several of the places, however, this massing of the cells in the stroma is evident. In these localities, and a few others, a little suggestion of stricture is to be noted. In other places, the cells are arranged around a blood vessel for a center. In these sections, I do not make out any of the irregular karyokinesis, which is a striking intracellular feature in malignant growths. From my experience with such cases as this, I am inclined to think, in spite of several very dubious areas, that there is a good chance that this growth, even with repeated recurrences, may finally be entirely and permanently eradicated. If possible, the site of the growth should be promptly exposed, so that any recurrence may be observed and extirpated."

December 21, 1905, Dr. Wright sent me this supplementary report:

"On examination of other portions of this growth, I am inclined to think we must give up any hope of its nonmalignancy. There is too much atypical proliferation not to expect prompt recurrence and metastases."

June, 1908, the growth recurred on the hard palate, and half of the left alveolar process and hard palate were removed.

Dr. Wright reported: "Sections of the growth removed on June 18, 1908, show the original adenocarcinomatous growth."

January, 1910. Removed right molar and surrounding tissue, except the skin.

March, 1910. Removed eye and contents of orbit.

May, 1910. Admitted to hospital with rapid extension into soft palate.

December, 1911. Specimens of the growth showed the same histologic characteristic.

July, 1914. Much involvement in orbit and soft palate.

He has lost considerable weight and looks badly; no metastases, does not complain of pain, no bleeding, no tendency to break down and ulcerate.

Saw him again in 1914. This time in a city hospital. No longer able to work. Growth has grown very slowly since 1910. Passed from observation after nine years.

Case 2.—A. C., age sixty-five years, married; retired naval officer. April, 1908.

Ten years ago he had first operation for nasal polyps and has had a number of such operations since. Twenty months ago, in Italy, his polyps were removed, which was followed in three weeks by rapid enlargement of the cervical glands at angle of jaw on both sides, with a gradual increase in size and number since. He has had several operations for the polyps in past years.

At present he has severe headaches, extending from frontal to occiput, nearly complete nasal obstruction, mucoid nasal discharge, which is, at times, streaked with blood, the amount of blood increasing the last three weeks.

The left eye shows paralysis of third and fourth nerves, fundus normal, cervical glands extensively involved, large and hard, probably some involvement of abdominal glands, cachetic. Begs relief from pains and nasal obstruction.

Nasal examination reveals ethmoidal region blocked with what appears to be polypoid degeneration, which bleeds excessively on probing.

A gland was excised from the neck.

Dr. Wright says: "There is little or no lymphoid tissue left in this gland. Its framework, for the most part, is a low grade connective tissue. This is infiltrated throughout with patches of cells, some of them arranged in the lymph spaces in such a manner and are of such a morphologic appearance

as to suggest that they are metastasic deposits of an adenocarcinoma."

Quite a hopeless condition, but the patient demands a consultation with the man who has been busy removing the polyps for the past eighteen months, and this doctor is quite incredulous as to its malignant nature and, as I refuse to operate, the patient returns to this doctor three weeks later, and dies on the table, of hemorrhage.

Case 3.—C. C., Italian, age forty-two years, male, married. March, 1911. Robust health; for the four months previous, partial obstruction and increased mucoid discharge; frequent bleeding. Nasal examination reveals left ethmoidal region filled with a soft, purplish growth, which bleeds easily on probing.

March 4, 1911. Specimen removed for examination.

Dr. Jonathan Wright reported "adenoma." "This seems to be of the same nature of the former specimen from the case—that is, it is an adenoma of uncertain potentiality, better, perhaps, to call it a cyst adenoma. Long, slender, non-ciliated epithelial cells are growing wild from a much altered stroma, which, however, they do not infiltrate, but from false acini and tubes, giving it the peculiar characteristics from which it takes its name.

The stroma is made up largely of a hyperplasia of the smooth muscle fibers or cells, resembling them both in cross section, and when viewed longitudinally through their terminal portions, perhaps, due to improper technic, are not shown satisfactorily.

While it is possible that the course of this growth left to itself would rapidly present evidence clinically of malignancy, it is not impossible that thorough eradication, if that is possible, might lead to a favorable result."

Operation.—Tied external carotid, and with a Ferguson incision, which was extended up to and through the eyebrow, with the soft tissues retracted, the bone of the anterior walls of the antrum, nasal cavity and frontal were removed, and through this large aperture the entire contents of antrum, frontal, ethmoids, sphenoid and nose were removed, leaving only the mucosa of the vestibule.

There was no evidence of the growth except in the ethmoidal cells.

Microscopic Diagnosis.—“Very atypical looking adenomatous structure in the tissue from ethmoid, but very little of it. Gland is inflamed, but shows no evidence of metastases.”

September, 1911. Same condition was found in the right ethmoids.

The original incision was reopened and the nasal septum entirely removed, and all of the contents of the right naris and sinuses removed, except the frontal sinus with no evidence of the growth except in the ethmoids as on the left side.

Microscopic diagnosis, September 6, 1911, by Dr. Jonathan Wright: “This still presents the characteristic histologic features of a malignant adenocarcinoma.”

November, 1912. Growth recurred in the scar tissue behind the root of the nose, with the same microscopic findings.

April, 1914. Diathermy tried with some improvement.

May, 1914. Growth appeared through cicatrix near inner canthus.

March, 1917. Slowly extending. Radium applied once a week. Left frontal sinus cavity filled with the growth, which was opened and curetted, and radium applied direct by Dr. Bissell of the Radium Institute.

May 19, 1918. The mass inside at root of nose slowly increasing in area; more involvement at inner canthus and a point presenting itself in eyebrow.

Now he has some pain from pent up secretion in frontal, which disappears when the secretion evacuates itself. No metastases. He has lost some weight under observation to date, seven years.

Case 4. F. F., age sixty-seven years, married, male; manufacturer. April, 1915. Robust health; seven years ago had polyps removed; again, three years ago; anosmia, neuralgic headaches, dating back for many years, not associated with nasal condition; no bleeding.

Examination.—Mucosa much hypertrophied; septal deviation to left; left ethmoidal region filled with polyps. No metastases. Transillumination, clear.

April 21, 1915. Removed polyps and ethmoidal labyrinth.

At about the middle of the ethmoids I discovered tissue dis-

tinctly different from the polypoid degeneration, it being soft, yellow and practically bloodless, and of the same character as that of Case 1.

This growth was removed in small pieces with forceps, because of the septal deviation, the total amount filling a bottle.

The pathologic reports are as follows:

Dr. F. F. Sondern's report: "Histologic Examination.—The specimen consists of a few flattened and irregular masses of grayish tissue, with a moderately firm consistency and a finely papillomatous appearance.

"Microscopic examination shows a papillomatous, hyperplastic growth of the upper nasal mucosa diffusely infiltrated with inflammatory cells (polynuclears, eosinophiles and lymphocytes).

The growth exhibits a marked tendency to convoluted and plicated arrangement, preserving at the same time a papillary structure. The cells are of the ciliated columnar type and are proliferated to form several layers.

Vacuolation, due to edema, is of common occurrence in the cells. Goblet cells are plentiful. The basement membrane appears to be intact. There seems to be little evidence of anaplasia on the part of the hyperplastic epithelium. The supporting stroma is of loose connective tissue formation and markedly edematous, and contains many thin walled blood vessels, which are for the most part empty. A few finely pigmented endothelial leucocytes are seen in the stroma.

Mitotic figures in the epithelial cells are rare, and in view of the hyperplastic nature of the growth it would seem that this is an important point in considering the question of malignancy.

From a histologic point of view, the tissue shows sufficient departure from the type to warrant regarding it with considerable suspicion as to its potential malignant capabilities, but at the present time it does not possess the structure of a frank carcinoma.

"Such hyperplastic growths in the nose, however, are prone to recur, and may take on malignant characters."

Pathologic report of R. M. Taylor: "Gross.—An irregular papillary mass weighing about one gram.

"Microscopic.—The growth consists of heavy columns of

epithelial cells several layers in thickness, cuboidal to columnar in shape, and having cells on the surface. They are supported by a branched meshwork of loose stroma, from which they are sharply demarcated. The cells are large, bladder-like and poorly stained. Proliferation is not very rapid, as only one dividing form was found. The specimen does not show whether the deeper structures are being invaded or not. Inflammatory cells of both the polynuclear and mononuclear type are scattered throughout. A tumor of similar nature and structure is figured in Wright and Smith's textbook on page 244. We do not believe that it is likely to metastasize, but may recur locally.

"Diagnosis.—Papillary adenoma."

The report of Dr. L. W. Strong: "The tissue consists of a plexiform epithelium with a minimal amount of stroma between the epithelial cells. There is no cornification. The cells, in places, are highly cylindrical. There is no gland formation.

"Diagnosis.—Epithelioma cylindrocellular plexiform."

Report of Dr. Jonathan Wright: "The examination of the specimen sent by you revealed an epithelial growth, probably malignant in nature, which should be classified, as far as I can judge from the small piece at my disposal, among the adenocarcinomata.

"The question of operation would depend entirely upon the clinical indications—that is, as to how far the thing had progressed, its situation, the general state of the patient, etc.; but, as you know, this form of growth is not so malignant as some others in the nasal cavity and, providing it was surgically possible to remove all the diseased tissue, it is an entirely justifiable procedure."

X-ray showed cloudiness in left ethmoidal region and antrum. Antrum was douched, with a clear return flow.

May 24, 1915. When the ethmoidal region had healed, it showed a suspicious spot about one-fourth inch in diameter on the anterior lateral ethmoidal wall.

Radical operation urged, but was refused. Patient died twenty months later in the South, after some six months, of a cerebral condition that was called meningitis.

Dr. Jonathan Wright has found that adenocarcinoma is the most frequent malignancy of the nose.

Rosenheim⁴ finds it the rarest.

Though it is the least malignant, two of my cases had recurrences after most extensive excision: Case 1 in two years, and Case 3 in one year, and also in Case 4 after intranasal removal, but here I knew I had not gone beyond the infiltration. The point of origin was clearly the ethmoids in Cases 3 and 4, and probably in Case 2.

In Case 1, the growth was entirely within the antral cavity, but too extensive to be sure of point of origin, but probably antral. Pain: Not until very late.

Hemorrhage early in Case 3, but not in the recurrences, late in Case 2.

Polyps were associated in Cases 2 and 4, while Case 3 gave clearly the appearance of a new growth in the ethmoids.

Dr. Jonathan Wright and Semon hold that a benign growth does not degenerate into malignancy. The polyps were merely a coincident. Thousands of polyps are removed repeatedly with malignancy observed only a few times.

15 East 48th St.

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XXXIV.

REPORT OF A CASE OF FOREIGN BODY (CARPET TACK) REMAINING TWO YEARS IN BRONCHIAL TUBE WITHOUT PATHOLOGIC SYMPTOMS.

BY DUNBAR ROY, M. D.,

ATLANTA.

In the present day refinement of bronchoscopy it seems much out of place to report a foreign body as remaining in the bronchial tube or even in one of the twigs, without its removal. Authors always publish their successes, but few have the temerity to report their failures.

The writer has done but little clinical bronchoscopy, for he long ago realize that this work should only be undertaken by men who, from a natural aptitude in working along this line, have placed themselves in a position to have these cases referred to them, increasing thereby their clinical experience and rendering themselves more proficient in obtaining good results.

The writer believes that there should be such a thing as a peroral specialist in different parts of the country to whom such cases could be referred and from whom the patients could receive the best operative skill.

It is a matter of impossibility for men who only occasionally see cases of foreign bodies in the bronchial tubes, to keep themselves in that extreme practice which is absolutely necessary for dexterity in the removal of these bodies.

While no laryngologist is willing to allow a foreign body to remain in the bronchial tubes if it is possible to extract it, cases, however, have been reported where the foreign body has remained in situ, either finally producing a localized lung abscess or becoming encysted, remaining in this manner without producing any untoward symptoms.

The present case is reported, not with the idea that there may not be some future trouble, but one of interest in that up

to the present time, two years since the accident, the patient has remained in good health with no symptoms of discomfort.

Miss C. E. D., age twenty-eight years, domestic, gave history of eating puffed rice and in some unknown way sucked into her larynx a small brass head carpet tack. She was immediately seized with a violent spell of coughing and some difficulty in breathing. She consulted Dr. Crawford, who had an X-ray taken, and this plate showed the tack in the right bronchial tube between the seventh and eighth ribs, with the head of the tack pointing down. She was sent to Grady Hospital, and with the assistance of Dr. Crawford and Dr. McDougall I attempted its removal under local anesthesia, using the Brunnings bronchoscope. Our attempts proved unsuccessful, so we decided to allow the irritation to subside, and on the next day passed the bronchoscope through a low tracheotomy incision. We then made use of the fluoroscope and in this way attempted the removal of the foreign body under a most excellent shadow. It seemed as if the foreign body was in one of the branches of the large tube, causing us to be unable to grasp and dislodge the tack. After several attempts we decided to desist from further instrumental manipulations and allow the tracheotomy wound to heal, leaving the foreign body in situ for fear of more damage than the presence of the tack itself. Patient experienced no further trouble and remained comfortable. No temperature, cough, or expectoration after the first few days. Patient then continued her work without interruption. On November 14th, five months later, at a meeting of the Southern Medical Association, our Fellow, Dr. R. C. Lynch, undertook again the removal of the tack. The X-ray showed that it was in the same position. Under general anesthesia, Dr. Lynch had no difficulty in passing the bronchoscope, although he found that all the tubes he possessed were too short. He also located the foreign body in one of the side bronchial twigs. Not having the necessary length tubes and being unable to obtain any in our city, the foreign body still remains in the same position as previously shown.

Following this second operation, the patient experienced no difficulty whatever and in a few days was again at her domestic work. I have seen her several times since, now about two

years since the original accident, and she has increased in weight, with every evidence of no discomfort. I show you two X-ray photographs. The first is the one taken at the time of the accident, and the second just a few days ago.

A somewhat hurried research into literature for accounts of foreign bodies in the lungs or bronchi of two or more years' sojourn, brought to light notes of forty-seven cases, or forty-eight, including the personal case. Since continuation of the research failed to discover any further case, the author feels that not many have been overlooked, although to make sure, it would be necessary to read over hundreds of case reports and discussions of papers. The importance of the subject is hardly such as to warrant such an outlay of time and pains.

The age of the patient, the kind of foreign body, the immediate symptoms, and the fate of the patient need not greatly concern us in this particular collection of data, for in the first place they throw no light on the main question of length of sojourn in the chest. As might be expected, the longer the sojourn, the fewer the number of cases. The number of cases in which the sojourn was two years or less than three years was ten. Had we noted the cases of one full year and less than two years, this would have been correspondingly larger. The number of cases of sojourn of three full years and less than four years was six; of four to five years, two cases; five to six years, two cases; six to seven years, three cases; seven to eight years, five cases; eight, nine and ten years, two cases each. These irregularities disappear if we proceed by five year periods. Thus, from two to seven years, the total number was twenty-three cases; from seven to twelve years, the total number was thirteen cases. The number from twelve to seventeen years, exclusive, was four cases, and that from seventeen to twenty-two years, exclusive, was two cases. These figures show plainly that the more remote the period of operation, the fewer the cases.

Gross, in his monograph on foreign bodies in the air passages (1854), could make but two classes of cases, to-wit: Those in which the foreign body was coughed up and those in which it was found at autopsy. Since about 1897 two other classes have been added: those removed by bronchoscopy, and, in theory at least, those recognizable (but not removed) by the

X-ray. A fifth class is also possible—those removed through the chest wall.

Some interest doubtless attaches to the foreign bodies of longest sojourn. The record is held by an old American case—that of Bartlett, reported in 1846, in which a chicken bone, swallowed at the age of three years, was coughed up sixty years later. Chevalier Jackson is second, with a record of twenty-six years' sojourn for a collar button removed with the bronchoscope. The third place is held by the case of Eldredge of Rhode Island, the sojourn being twenty-three years. The case was reported in 1860 and the reference does not mention the nature of the object. The cases of Lescure in the eighteenth century and of Beer of New York in 1916 are tied for fourth place at seventeen years. The former was one of expectorated bone, and the latter one of a paper clip removed with the bronchoscope.

A case of fourteen years' sojourn was reported in 1876 by Reclam, in which the foreign object was a needle. Of more than usual interest was the coincidence in which two Americans, Whitley of Georgia and Woolsey of Tennessee, two years apart, 1878 and 1880, reported almost duplicate cases of a cockle burr coughed up eleven and twelve years, respectively, after aspiration. We omitted to mention in its proper place the case of a pin coughed up after sixteen years. The case was reported in 1886 by Colquhon of Australia. Another case of long sojourn was reported in 1842 by Carpenter of Guy's Hospital, in which some teeth were found in the lung at autopsy, thirteen years after aspiration. During the present year, Walters of California has reported the removal, with the bronchoscope, of a piece of bone aspirated eleven years before. The longest sojourn in Killian's practice seems to have been a needle, for ten years. Another ten year sojourn is recorded by Dupuytren in connection with a coin. It seems hardly worth while to continue this narration because of the complete want of type. There appears to be no reason why any kind of foreign body cannot sojourn in the lung for any interval.

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XXXV.

BLASTOMYCOSIS OF THE UPPER RESPIRATORY
TRACT, WITH REPORT OF A CASE PRIMARY
IN THE LARYNX.*

BY FRANK L. DENNIS, M. D.,
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Since the first case of systemic blastomycosis was reported by Busse and Buschke¹ in 1894, there have been published forty-seven cases originating in America. Several summaries of cases have been made, notably Hektoen's² in 1907, and Montgomery and Ormsby's³ in 1908, which include the cases of Busse and Buschke, Curtis and Gilchrist. None of the latter writers mentions involvement of the upper respiratory tract.

In an excellent review of the literature, with a classification of all the cases previously reported and with the addition of five cases of their own, Wade and Bel⁴ have thrown out reports from the other countries, owing to confusion in diagnosis between blastomycosis and infection by other fungi, and in the present discussion it seems best to follow their example and confine ourselves to the consideration of only those cases reported from America, with one exception, to be noted later.

Of these forty-seven cases, six showed lesions somewhere in the upper respiratory tract, either clinically or at necropsy, and in the autopsy report of one other,⁵ is the statement that laryngitis, tracheitis and bronchitis were found, but with no information as to whether these were due to the blastomycetes or were secondary to the specific infection.† Wade and Bel do not include this case as one of laryngeal invasion in their table of "distribution of lesions in the necropsied cases," and with them I shall consider these lesions as secondary ones.

Of these six cases, autopsies showed that the larynx was

*Candidate's thesis.

†Cleary's anatomic diagnosis in this case, so far as the upper respiratory tract is concerned, is "decubitus necrosis of the larynx, mucopurulent laryngitis, tracheitis and bronchitis."

involved in three,⁶ retropharynx in two,⁷ and in another case which was still alive, the disease began with a suppurative tonsillitis,⁸ lasting thirty-six days, presumably of blastomycotic origin.

To these cases may be added three others by Simoni,⁹ in which blastomycetes were found in tissue removed from cases of tuberculosis vegetans of the nose. No histories of the cases are given, the writer contenting himself with a description of the histologic findings. He was able to demonstrate giant cells and tubercle bacilli as well as blastomycetes in the sections. The material for his study consisted of two tumor-like specimens furnished him by the director of the Anatomical-Pathological Institute of a Milan hospital and of a similar specimen from a case in his own practice. He describes them as being about the size of a bean, of hard consistency, resistant to cutting and of a pink color. The specimen from his own case was removed from the anterior portion of the left inferior turbinate. He was unsuccessful in isolating the blastomycetes. Owing to his failure to give any clinical history whatever of the cases, no idea can be formed as to whether the type of the disease was the same as that reported by others, or whether the fungus was of a similar strain. One gets the impression from reading his article that he rather regarded the presence of the blastomycetes as accidental and of no consequence except as it might have had some modifying effect on the course of the tuberculosis. (It is open to question whether these cases are instances of true blastomycosis.)

Christensen and Hektoen¹⁰ report a case of blastomycosis involving cutaneous, subcutaneous and muscular tissues in which tubercle bacilli were later found in the sputum, but no blastomycetes were found in it at any time. No autopsy was had in this case except that the skin was examined. This is a case where the two diseases were present in the same individual, but apparently not involving the same tissues.

In none of the reported cases, with the possible exception of Case 15 of Ormsby⁸ and Simoni's⁹ cases, was the primary manifestation in the upper respiratory tract, this region having become involved later during the course of the general systemic invasion.

According to Stober¹⁰ and others, the resemblance of sys-

temic blastomycosis to tuberculosis is most striking and any case resembling tuberculosis clinically and in which it is not possible to demonstrate the tubercle bacilli, should arouse suspicion and an examination of unstained sputum with the addition of potassium hydrate solution, 1 to 10 per cent, should be made.

The majority of the cases have been found by Chicago observers and have come from the middle western states, although cases have been found in New York, the Atlantic Coast states, in the south, Canada, Colorado and on the Pacific coast.

Only four cases have been found in women; it seems not to be inherited or contagious and, with few exceptions, the victims have been subjected to hard work and exposure and lived in unhygienic surroundings. Dampness predisposes, Stober finding that his cases lived in damp, moldy rooms, often in basements.

The respiratory tract is the atrium of infection in most cases, dissemination from the cutaneous lesions not often occurring.

The blastomyces is the specific cause of the disease. It occurs as a round or oval budding fungus with a double contoured capsule, is frequently found in pus and sputum from the lesions and abundantly in the tissues affected.

Brown and Cummins¹¹ in an exhaustive study of the differentiation between blastomycosis and coccidioidal granuloma, say: "Microscopically both the coccidioides and blastomycetes in animal tissues presented the characteristic endosporulation and budding processes respectively. Neither in the pus nor in the solid tissues at any time, could we demonstrate budding forms in coccidioidal disease nor evidences of ensporulation in blastomycosis."

Histologically the lesions, especially in the respiratory tract, closely resemble tuberculosis. In fact, a number of cases have had an anatomic diagnosis of tuberculosis until a later revision of the findings has revealed the true nature of the malady.

Stober¹⁰ mentions the fact that in the viscera, definite nodules are found which closely resemble tuberculosis and he also says that acute laryngitis and bronchitis were usually associated with active pulmonary lesions and pleural changes.

Practically no tissue in the body is exempt from attack, though the lungs head the list in frequency with a percentage of ninety-six in a total of twenty-seven necropsied cases collected by Wade and Bel.⁴

In the majority of cases the first symptoms are referred to the respiratory tract. It is striking how many of the cases date the origin of their illness from "taking a cold." Following this, various symptoms arise, such as dyspnea, pain in the chest, cough and expectoration of either purulent or bloody sputum. Active hemoptysis is rare. In a few cases the disease has originated from or subsequent to an injury and local and systemic manifestations follow in a short time. Usually an abscess develops at the site of the trauma and fails to heal. More or less rapidly evidences of generalized invasion follow, characterized by malaise, loss of weight and strength, pain, irregular chills and sweats, fever, multiple abscesses, etc.—in short, the signs and symptoms of pyemia. Nephritis, enlarged spleen, leucocytosis and anemia complete the picture and death is from exhaustion.

The duration is from a few months to several years.

Differential Diagnosis: Systemic blastomycosis is most likely to be mistaken for tuberculosis. The fact that the lungs are so frequently involved with cough, dyspnea, purulent, blood-streaked sputum, fever and rapid emaciation explains why this is so. Even localized lesions like the larynx or skin resemble tuberculosis very closely. Hemoptysis and cavity formation are more common in tuberculosis. Examination of the unstained sputum, having in mind the possibility of the presence of blastomycosis, especially in those cases where no tubercle bacilli can be found, will often reveal the presence of the fungus in blastomycosis. Unless complicated by tuberculosis, the tuberculin reaction will be negative. It was so in two of Stober's cases.

As between syphilis and blastomycosis a negative Wassermann test would rule out the former.

Coccidioidal granuloma is a very similar disease to blastomycosis. Confusion in the diagnosis has often arisen. It is said to resemble tuberculosis even more closely than blastomycosis does, is of shorter duration, has a greater tendency to involve lymph nodes, and there are differences in the two

organisms which are distinctive. Thus, in the tissues the reproduction of the blastomyces is by budding, and of the coccidioides by endosporulation. Further, according to Brown and Cummings,¹¹ the initial growth on media of the coccidioides is rapid (twenty-four hours), whereas blastomycetes require ten to fourteen days; the optimum temperature for the former is 37° C., and for the latter, 20° C.

The prognosis is very grave, the mortality being ninety per cent, as stated by Stober.

The treatment is prophylactic, climatic,¹² and large doses of potassium iodid, as much as half an ounce or more daily. Roentgen rays and radium¹³ have been used.

In the case of a localized lesion in an accessible point, thorough and early surgical removal has resulted in cure.

Vaccine therapy was used in one of Stober's cases with curative effect.

* CASE REPORT.*

*This case was reported briefly in *Journ. Amer. Med. Assn.*, LXX, 85, by Dr. Downing.

The case I wish to report is, I believe, unique in that, so far as I am informed, it is the only case up to the present time which has originated in the larynx and which in the beginning showed no other signs. Its importance to laryngologists lies in the fact that the diagnosis was distinctly a laryngologic problem. The patient was an inmate of the Modern Woodmen Sanitarium, an institution devoted to the treatment of tuberculosis, which receives most of its patients from the Middle West. He was sent there with a provisional diagnosis of tuberculosis, and since the medical staff could find no evidence of that disease he was referred to me for an opinion on his laryngeal lesion. It is through the courtesy of Drs. Crouch and Downing of the sanitarium staff that I am permitted to make this report. His history is as follows:

Mr. G., age thirty-nine years.

Family History.—Knows nothing about his father. Mother had "kidney trouble," and died suddenly at age of forty-nine years; miscarried once after patient's birth. No brothers or sisters.

Previous History.—Is married and father of six living healthy children. Has lived all his life in the Middle West

and South, working at various employments, mostly in towns. Last residence was in Kansas, where he lived twelve years. Had spinal meningitis, measles, and whooping cough in childhood, pneumonia at seventeen; has had gonorrhea; "rheumatism" four years ago. Uses tobacco but no alcohol.

Present Illness.—Was working in the summer of 1916 in a grain elevator, where there was a great deal of dust. In August had severe tonsillitis, which was treated with iodin. This got better until he was sent to work cleaning out the "dump" or pit of the elevator, when he got much worse, and the trouble settled in the larynx. This "dump" contained old decayed wheat, rotten wood and rat manure, had not been cleaned before in years and was very dusty and moldy. Coughed and sneezed continually, and finally became hoarse and had pain in the throat. Lost strength and was forced to give up work on October 5th. Admitted to the sanatorium on November 10th, where the following notes were made:

"Pain in ear, no expectoration, strength good, digestion and appetite good, average weight last three years, one hundred and twenty-five pounds. Highest weight, one hundred and thirty-five pounds. Now weighs one hundred and nine pounds. Had abscess in forearm July, 1916; coughs; has pyorrhea; palpable cervical glands; eczema lower third of the left leg."

Chest Examination by Dr. Crouch.—Has a few fine râles and roughened breath sounds right apex in back. Chest findings not well marked. X-ray shows lungs clear.

Blood Pressure.—S., 120; D., 80.

Temperature normal.

No tubercle bacilli in sputum after repeated examinations.

When seen by me on November 16, 1916, he revealed an infiltrated and ulcerated area involving the epiglottis and median glossoepiglottic ligament, both arytenoid regions and false cords. Nothing of note in pharynx.

Nose.—Marked irregular deviation of septum obstructing left side.

A piece of the infiltrated tissue of the epiglottis was removed by me and sectioned by Dr. Downing, who reports as follows: "Section from piece of epiglottis shows epithelium eroded in places by collections of small cells in which are many double contoured, some budding, blastomycetes. Many

large giant cells. Diagnosis: Blastomycosis of epiglottis and larynx."

On November 28, Dr. Downing found a few blastomycetes in a smear from the ulcer on the epiglottis.

Wassermann was negative in two examinations.

Temperature has varied between 98 and 99 degrees, once or twice going a few tenths above 99°.

The patient was at once put on potassium iodid in increasing doses, and X-rays were applied to outside of the larynx at weekly intervals. After a few weeks' treatment his general appearance improved and he gained eight or ten pounds. The infiltration in the larynx diminished so that his cords could be seen, which were invisible at the first examination.

Owing to his intolerance of iodids the patient was not able to take adequate doses, and that part of his treatment had to be frequently interrupted. As a result, he began to lose ground and the infiltration in his throat to spread so that, owing to increasing stenosis, it was necessary to do a tracheotomy on February 21st. Another X-ray taken a few days later shows distinct trouble in his lungs.

This case apparently had at first no other lesion except that in the throat. While it is possible he may have had involvement of the lungs also, the chest and X-ray findings were so meager as to make this extremely doubtful. The history seems clear that he received his primary infection in the larynx from breathing the contaminated air from the dusty, moldy pit in which he worked, and that the lungs became secondarily involved. The patient returned to his home. Death occurred in October, 1917. No autopsy was permitted.

In none of the cases reported in which the upper respiratory tract was involved, with the exception of Ormsby's case,³ did the disease originate in this region. In this case it apparently began with a suppurative tonsillitis lasting thirty-six days and terminating in pneumonia, which confined him to his bed for seven weeks, following which he had cough and moderate expectoration. Shortly after this, blastomycotic lesions developed in various parts of his body. At the time of the report this man was at death's door. It is of course impossible to say whether the original tonsillitis was or was not of blastomycotic origin. At best, one can only assume that it was be-

cause of its unusual duration and the subsequent development of blastomycotic lesions elsewhere in the body. In the case I report there can be no doubt of the primary lesion being in the larynx and that this lesion is due to infection by blastomycetes. It is probably only a coincidence that my own case also began with a tonsillitis which, however, was apparently merely of the usual sort and had no special characteristics. Furthermore, in Ormsby's very detailed report of his case, which covers a period of almost two and a half years, no further mention is made of any trouble in the throat. It is probable that had the original tonsillitis been of blastomycotic origin, complete healing would not have occurred but that regional extension would have supervened.

In Hill and Dickson's case¹⁴ the disease lasted one year, beginning with a cold, and on admission to the hospital, six months later, the infection was generalized; but with no symptoms particularly referable to the upper respiratory tract except a slight cough. Autopsy report showed larynx involved by a number of small shallow ulcers along the margin of the right vocal cord, and "when pressure is exerted over the outer surface of the thyroid cartilage, pus exudes through these ulcers into the larynx."

Cleary's case⁵ began with a cold several months before admission to the hospital; for ten days before admission had been hoarse. Shortly before death, which occurred in nine days, complained of sore throat and pain in the right chest and was aphonic. At autopsy a decubitus necrosis of the larynx was found, and Cleary concludes his report as follows: "and in our case, although not examined microscopically, the ulceration opposite the cricoid cartilage corresponded in all its gross appearances and location with the decubital necrosis in this region." He regards the lungs as the first organ affected.

Ormsby and Miller's case⁶ is very interesting, owing to its resemblance to tuberculosis. The patient was not strong for ten years. Six months before admission to the hospital caught cold, which settled on his chest, coughed and expectorated blood-streaked sputum. Soon had symptoms of laryngitis with complete aphonia, but no pain, and ulcers were found in the larynx. "These ulcers differed in appearance and location from those of tuberculosis, being circular with smooth bor-

ders, not presenting a worm-eaten appearance." "There were four on the epiglottis, one each on the left aryepiglottidean fold, the left ventricular band and the right true vocal cord." Tuberculin test negative. The postmortem examination revealed enormous numbers of blastomycetes in all the preparations from the lungs, liver, etc., and also from the ulcers in the larynx and trachea. No tubercle bacilli were found in any of the sections.

In Irons and Graham's case⁶ there were no symptoms referable to the upper respiratory tract during life, but autopsy by Le Count showed, "in the covering of the thyroid cartilage on the right side there is a small cavity containing purulent material. The cartilage below appears to be normal. The larynx and trachea show no changes. No tubercle bacilli could be demonstrated. This is not, strictly speaking, a case involving the larynx but only the tissues covering it."

In the report of the case of Eisendrath and Ormsby,⁷ no reference is made to any clinical signs of a retropharyngeal abscess, but Le Count and Myers¹⁵ in their final report of this case found a large retropharyngeal abscess. The first symptoms in this case were pulmonary, and blastomycetes were found in the sputum.

The case of Washburn¹⁶ is an example of blastomycosis following trauma. The lesion began following injury to the elbow, and three months later there were hoarseness, cough and expectoration, which increased after one month, and the patient lost weight rapidly. Later a retropharyngeal abscess was evacuated, the pus from which revealed blastomycetes in large numbers. Repeated examinations of the sputum for tubercle bacilli and blastomycetes were negative.

Autopsy was confined to the chest and abdomen. No examination of the larynx or retropharynx was made. Blastomycotic lesions were found in the lungs, spleen and liver resembling miliary tuberculosis.

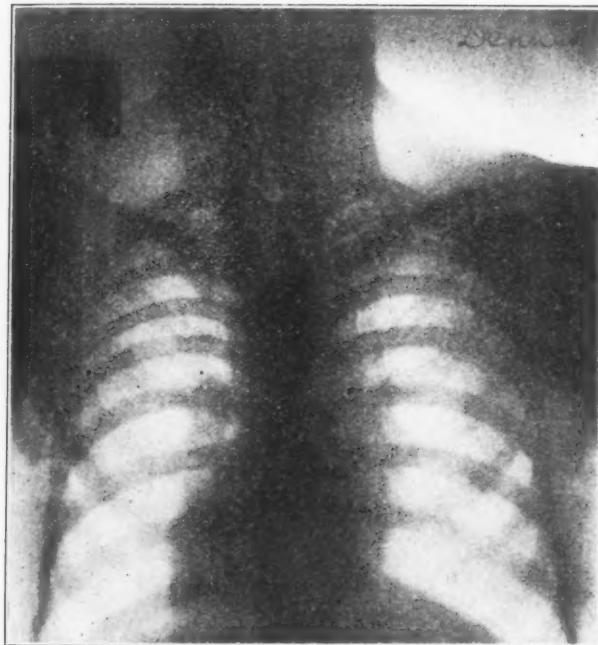
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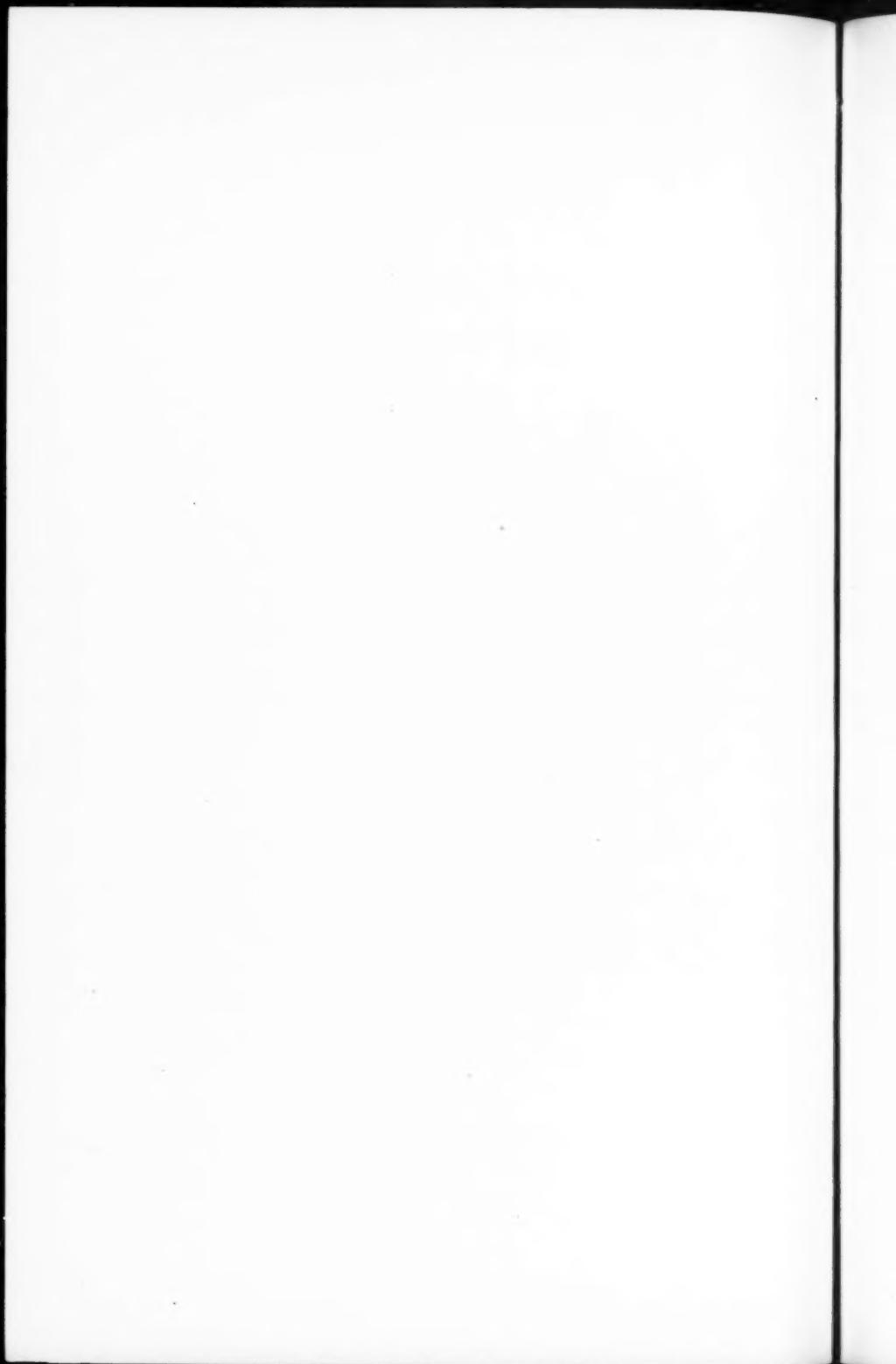
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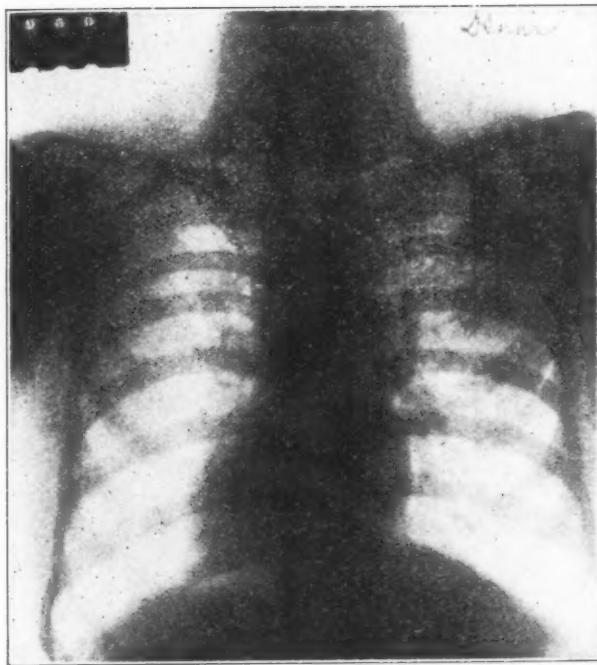




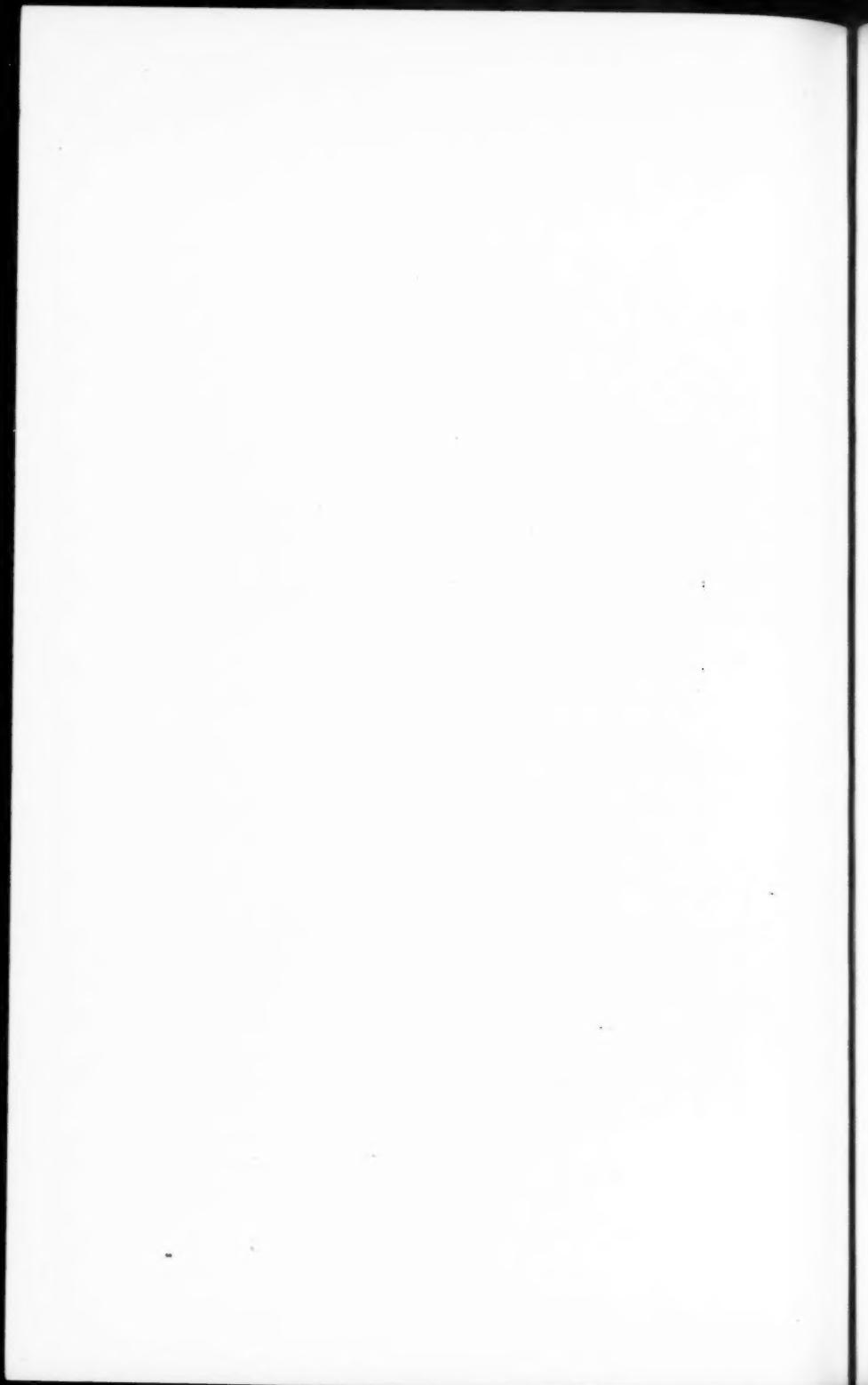


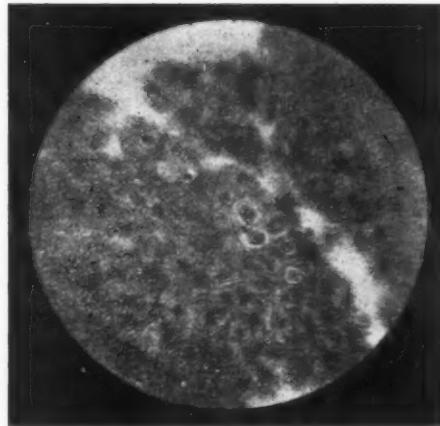
Case of blastomycosis of the upper respiratory tract.
Taken December 20, 1916.



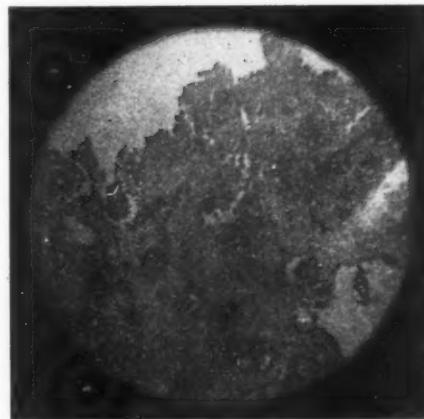


Case of blastomycosis of the upper respiratory tract.
Taken March 12, 1917.

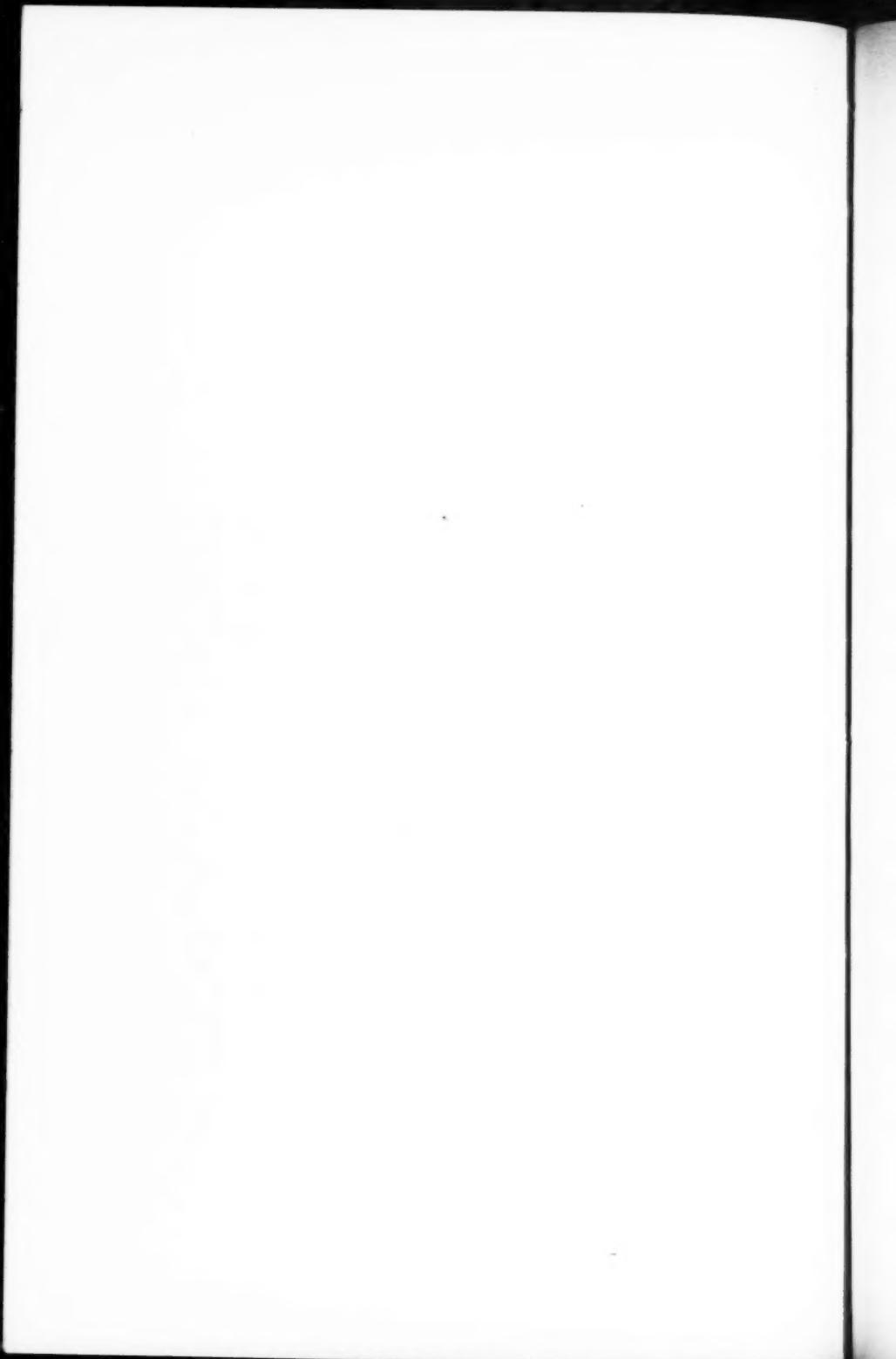




Case of blastomycosis of upper respiratory tract.
Section of epiglottis. X475.



Case of blastomycosis of upper respiratory tract.
Section of epiglottis. X45.



XXXVI.

REPORT OF A CASE OF GRANULOMA OF THE MAS- TOID SIMULATING SUBPERIOSTEAL ABSCESS.

BY JOHN D. RICHARDS, M. D.

The patient, a child under one year of age, had, six weeks prior to coming under observation, a slight discharge from the ear, which ceased in a few days. The ear was not seen by a physician at that time, as the condition subsided, and the patient took no further note of it. A few days before I was called to see the child there had appeared a marked swelling behind the ear.

Upon examination, the following condition was found: The auditory meatus was collapsed and it was impossible to see the drum. There was no free discharge present in the canal. The auricle was protruded forward, as in subperiosteal abscess, and the postaural swelling was, to all appearances, that of an ordinary subperiosteal abscess without the inflammatory condition of the scalp. Fluctuation was present.

Upon operating, the incision—instead of opening into a cavity filled with pus—revealed a grayish yellow tumor occupying the site of the mastoid and completely filling it. Upon removing the main mass, it was seen that the tumor had as its base the dura of the temporosphenoidal and cerebellar lobes, the dural plates having been completely destroyed through pressure erosion; it was due to this that the impression of fluctuation was given when the postaural swelling was palpated. The vertical limb of the sigmoid sinus was obliterated, and the tumor mass was attached to the dura of both brain lobes. There was no posterior bony canal wall to the meatus; the middle ear cavity was packed with the mass. The capsule of the joint of the jaw was exposed through erosion of the anterior wall of the bony meatus, which had largely disappeared. The tumor had broken through the mastoid tip, so that there was a considerable portion of it infiltrating the tissues of the neck in the region of the digastric muscle.

At the time of operation the case was regarded as being

one of sarcoma, in which no attempt should be made to remove it other than to curette out roughly such portions as would temporarily relieve pressure. This was done. No attempt was made to create a meatal flap. The wound was sutured almost completely, only a small opening being left for the insertion of a wick for drainage.

The laboratory reported the tumor to be a round cell sarcoma, and an unfavorable prognosis was given. At the expiration of ten days the local condition of the wound was suspiciously good. About this time I received a report from Dr. Jonathan Wright, in charge of the hospital laboratory, to the effect that upon personally examining a number of sections of the tumor it was his opinion that the tumor was not sarcoma but was composed of granulation tissue only.

The recovery of the case was exceedingly rapid. There was little discharge from the cavity at any time, and the wound would probably have healed by primary union had it been completely closed. Two years later the child was seen again, in perfect health, though there was an atresia of the membranous meatus.

XXXVII.

REPORT OF A CASE OF MASTOIDECKOMY FOR
ACUTE SUPPURATIVE OTITIS MEDIA, FOL-
LOWED LATER BY FACIAL PARALYSIS,
ALMOST TOTAL DEAFNESS, MENIN-
GITIS AND DEATH.

BY JOHN RANDOLPH PAGE, M. D.,
NEW YORK.

In this case, the brief report of which follows, a facial paralysis began to develop three days after a simple mastoid operation, and in two days it was complete. Seven days after the operation there occurred suddenly, with vomiting and tinnitus, but apparently without nystagmus or vertigo, total loss of hearing in the opposite ear, and it was then noticed positively for the first time that there was almost total loss of hearing on the operated side. A high leucocyte count and cloudy cerebrospinal fluid were present, with a mental condition that remained unimpaired almost to the last day.

A delicate boy, ten years old, had a simple mastoid operation performed on his right ear in May, 1916, from which he made a good recovery. He was unusually bright and sensitive, and not robust, though he had improved in health during the past two years. On the twenty-sixth day of January, 1918, eight days after the development of an abscess in his left ear, he was seen by the writer for the first time since the operation two years before. At this examination his temperature was 103 by mouth, and he complained of severe headache. His mastoid was acutely tender, with a profuse characteristic discharge from the middle ear and marked sagging of the posterosuperior canal wall. Immediate operation was advised and consented to.

A thin darkened cortex was removed with a rongeur, and a pneumatic mastoid was found filled with pus, a culture from which showed hemolytic streptococcus. The cells were involved behind and internal to the facial nerve, but no exposure

of the nerve was made. What appeared to be healthy dura was exposed in the region of the attic and antrum, and the sinus was exposed over its vertical limb. The exposed sinus wall on the seventh day after the operation, when the temperature rose to 104, still had no granulations over its lower part and it looked as if infection might be passing through it, but in the next day or two it showed a healthy appearance, and the blood culture was negative.

The patient was comparatively comfortable the day after the operation, though his temperature at 9 a. m. was 103 by rectum. During the next eight days the bedside notes are of interest, showing what may have been an invasion of the meninges along the left facial nerve, with little or no disturbance of the static labyrinth, and the gradual development of a basilar meningitis, which caused total loss of hearing in the opposite ear and death a few days later without impairing the mental condition of the patient until almost the very end.

January 28th, second day after operation. Temperature ranged between 100 and 101. Patient felt nauseated and vomited small amount of clear fluid. Urine showed presence of acetone and diacetic acid. Bicarbonate of soda and ice water was administered by mouth and bicarbonate of soda and glucose by rectum. Vomiting ceased.

January 29th. Temperature ranged from 98.6 to 100.2. Rested comfortably. Full dressing was done under nitrous oxid anesthesia. A slight paresis of the muscles of the left side of the face was noticed. Acetone and diacetic acid was no longer present in the urine. Patient cheerful. No evidence of vertigo or labyrinthine disturbance.

January 30th. Temperature ranged from 99.2 to 101. Fairly comfortable morning. Later complained of headache. Paresis of facial muscles increased. Wound showed considerable purulent discharge. Dakin's solution was instilled in the wound through a tube every two hours. Sat up in bed.

January 31st, fifth day after operation. Secretion in wound less. Dakin's solution discontinued. Temperature ranged between 98.2 and 100.6. Comfortable day. Slight headache at night. Facial paralysis practically complete.

February 1st, sixth day after operation. Temperature ranged from 98.2 to 101.2. Vomited slightly at 8 a. m. and

complained of slight headache. Had fairly comfortable day, however, and retained his nourishment.

February 2d, seventh day after operation. Complained of slight headache during the night. Temperature at 6 a. m. was 102.6. Vomited at 6:30 a. m. Vomited small amount of greenish fluid at 7:30. Up to this time there was apparently no difficulty in hearing. At 9 o'clock he vomited clear fluid. At 10:45 he was visited by me and was found sitting up in bed. As soon as I entered the door he called out in a loud voice, "Good morning, doctor," and shouted that he had a roaring in his right ear and could hear nothing. It was apparent that he could not hear the sound of his own voice. The nurse was asked how long he had been deaf, and she replied that she had only just noticed it, that he had been able to hear her well a short time before. A blood count was taken that morning which showed 42,000 leucocytes and 90 per cent polynuclear neutrophiles. Blood culture taken at the same time was negative, urine was normal and eye grounds were normal. Mental condition was bright. Dr. Duel and Dr. Mixsell were in consultation. Lumbar puncture was done by Dr. Dwyer at about 3:30 in the afternoon, when the temperature was 103.8. The cerebrospinal fluid was cloudy, but no bacteria were found on smear or culture. Lactic acid was present and sugar was present. There was pain in the back of his neck and between his shoulders, but there was no marked rigidity or very evident Kernig sign. Headache was intense in the morning, but after lumbar puncture patient slept well and said he felt better and had hardly any headache. The temperature was 104 and pulse 90 at night. Condition was improved except for the high temperature. There was no further record of vomiting until the afternoon of the following day.

February 3d, eighth day after operation. Temperature ranged between 101.2 and 103.8. Pulse from 84 to 104. Blood count, 44,000 leucocytes and 89 per cent polynuclear neutrophiles. Eye grounds were examined and found normal. During the dressing the patient remarked that his hearing was much better when the dressing was off the right ear. In the afternoon vomiting and headache returned. At 1:30 a. m. he complained for the first time of feeling dizzy and vomited immediately a small amount of dark fluid. During the night

he asked for some cherries and was allowed several which he retained. There was no apparent change in his mental condition, but in voiding urine he seemed unable to sit up as usual. He slept quietly all night and some of the time turned on his affected side.

February 4th, ninth day after operation. At 6 a. m. his temperature was 103. He retained some orange juice. At 7 a. m. he complained of being hungry and ate a little cereal and milk. At 9 a. m. he had a temperature of 103 and complained of shooting pains in his forehead and later pains in his head and spine between the shoulders. At noon his temperature was 103.8 and he was very thirsty. At 1:30 he vomited a large amount of undigested milk. At 2 p. m. he voided urine in bed. An hour later he became noisy and screamed with pain. He was quite rational. His temperature in the afternoon was 103.6; blood count, 47,600 leucocytes and 88 per cent polymonuclear neutrophiles. At 6 p. m. he was quiet and rational. Vomited small amount of clear fluid. During the night he vomited several times, complained of intense thirst and was irrational at times.

February 5th, tenth day after operation. Patient had typical meningeal cry. Rational only at times in the morning. Temperature dropped from 104 at 6 a. m. to 100.2 at 3 p. m., and at 6 p. m., two hours before his death, temperature was 104.4.

No autopsy was obtained.

From the second day after the operation until two days before his death the patient frequently sat up in bed and showed no loss of equilibrium. While until the last there remained a slight amount of hearing in the left ear, it was only for very loud sounds, and words could not be distinguished except on one or two occasions when the dressing was off. There was sudden and total loss of hearing in the right ear.

An interesting point to decide is, whether this was a labyrinthine deafness or a retrolabyrinthine nerve deafness. The sudden loss of hearing with roaring tinnitus and vomiting leads one to think first of the labyrinth, but when it is recalled that from first to last the patient was at all times able to sit up without disturbance of equilibrium it seems improbable that any destruction of the labyrinth could have taken place. For while a simultaneous obliteration of both laby-

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rirths might occur to cause total deafness without nystagmus, such sudden destruction would necessarily be accompanied by some very evident disturbance of equilibrium.

The conclusion reached is that meningitis was the cause of the persistent vomiting and deafness, and not disturbance of the labyrinth, and that invasion of the meninges very likely took place in this instance along the route of the facial nerve.

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XXXVIII.

REPORT OF SOME INTERESTING CASES OF VINCENT'S ANGINA.*

By CLEMENT F. THEISEN, M. D.

There have been a considerable number of papers on Vincent's angina published during the past few years, and much has been accomplished in the way of treatment.

It is, of course, an accepted fact that the fusiform bacillus, with the spirillum or spirochete, are always found in the throat swabs in cases of Vincent's angina, and together with other characteristic clinical findings make the diagnosis positive. The organism causes a pseudomembranous ulceration of the throat and other parts of the fauces, being sometimes confined to the tonsils, but in the severe cases often involving practically the entire fauces and other parts of the mouth.

This bacillus is, however, not the specific organism of Vincent's angina alone, but is found in mastoiditis, hospital gangrene, bronchopneumonia, diphtheria, throat syphilis and stomatitis. Cultures and smears usually show mixed infections with other organisms, mainly the pneumococcus, Klebs-Loeffler and staphylococcus.

The ulceration of Vincent's is frequently mistaken for the ulceration of syphilis or diphtheria, perhaps because only the cultures were examined and not smears as well.

The organism flourishes in unhealthy mouths, particularly around decayed teeth and diseased tonsils. In the writer's experience the infection usually starts around a bad molar tooth and spreads from there to the tonsil and other surrounding parts.

Halsted, in his very complete paper (*Trans. A. L. A.*, 1912), states that there are two distinct clinical types of the disease, the one form to be differentiated from diphtheria and other nondiphtheritic pseudomembranous anginas, while in the other

*Read before the American Laryngological Association, May 27, 1918.

form localized ulceration simulating syphilis very closely is present.

In the writer's experience, the second type mentioned by Halsted occurs almost exclusively in adults, while almost all authors agree that the first type, simulating diphtheria and other membranous conditions, particularly those in which the streptococcus predominates, is far more frequent in young people. In practically every case of the ulcerative type the writer has found carious molar teeth with unhealthy gums—in fact, in nearly all adult cases the disease develops in mouths that are not well cared for. The odor is distinctive and characteristic, and in many cases the diagnosis can be made on that alone. In the cases that are not promptly treated and go on to extensive ulceration of the fauces, it is in fact almost unbearable. The fact that the type of the disease in children so closely resembles diphtheria accounts for many of the mistakes in diagnosis.

In the Michigan State Laboratory in 1909-10, out of six hundred and eighty-seven throat swabs sent in to be examined for diphtheria, one hundred and seventy-eight were not cases of diphtheria at all, but proved to be Vincent's angina. A clinical diagnosis of diphtheria had been made in two hundred and twenty-four of the six hundred and eighty-seven cases, but the bacteriologic diagnosis proved that only one hundred and twenty were true diphtheria cases.

Forty-six of the cases clinically diagnosed as diphtheria proved to be Vincent's angina.

Rolleston (Br. Journal Children's Dis., Vol. VII, 1910) states that of 18,187 cases of suspected diphtheria admitted to the Metropolitan Asylums' Board Hospital (London) from 1905 to 1907, 3,047 were found not to be diphtheria; of this number, 95 were cases of Vincent's angina.

Vincent himself found the disease in two per cent of all cases of membranous anginas.

Lublowitz found the specific organism in six out of thirty-eight cases of ulcerative stomatitis.

Rodella found them in about one-third of all the pseudo-membranous anginas he examined.

Cases of bronchitis have been reported by Rothwell (Jour.

Amer. Med. Asso., Vol. LIV, 1910), in which the main organism found was the fusiform bacillus.

Fatal cases are not as uncommon as is generally believed, and in children, some cases in which a diagnosis of laryngeal diphtheria had been made terminating fatally, and in which the Klebs-Loeffler bacillus was not found, were undoubtedly cases of Vincent's involving the larynx. The writer has seen cases of the ulcerative type involving both the pharynx and the larynx. These cases are always serious, and in children, when a pseudomembrane is also present in the larynx, are sometimes fatal.

Three fatal cases have been reported by Bruce, and others by Meyer and Halsted.

Halsted's case was particularly interesting. A young woman, aged thirty-three years, was sent to the hospital in a semi-conscious condition. The gums and mucous surfaces of the lips were covered with a thin membranous exudate, which later developed into an ulceration. The autopsy showed a chronic interstitial nephritis, endocarditis of the mitral valve, a bilateral chronic salpingitis, and ulceration of the mouth, larynx, trachea and esophagus. A bacteriologic diagnosis of Vincent's angina was made before death.

The writer would like to add two fatal cases to the above list. One has already been reported (Trans. Amer. Laryngol. Asso., 1912, p. 228). This patient, a tramp, about whom we could find out nothing, was brought to the hospital in a semi-conscious condition. His throat showed the worst ulcerative condition I have ever seen. The tonsils, uvula and part of the soft palate were practically destroyed, and there were deep ulcerations on the gums and mucous surfaces of the cheeks. Smears from swabs showed the specific organisms. He lived only a few days after being brought to the hospital, never becoming fully conscious. He received salvarsan intravenously and local treatment, without any result whatever. Just before death he developed hemorrhages from the nose, throat and rectum. Autopsy showed an ulcerative condition in the larynx as well, and a markedly enlarged spleen. On account of the great difficulty in examining his throat, the laryngeal involvement was not discovered during life.

The other case was seen recently and is quite similar to the one just reported.

The patient, a man, aged thirty-two years, came to my office complaining of a sore throat. I was at once struck with the extremely offensive odor when he came near me. The throat condition was almost as bad as in the last case. The uvula and part of the soft palate had been practically destroyed, and there was deep ulceration of both tonsillar surfaces and of the gums around the last molars. The ulcerated surfaces were covered with a tenacious pseudomembrane. The molar teeth were badly decayed and the gums bled easily when touched with a probe. The odor was so bad that it required a good deal of courage to examine him. He said the condition had been going on for several weeks, and he had received no treatment. He had been using a mouth wash of peroxid and water.

He was in an extremely weakened condition, because the pain in swallowing was so severe that he had not been able to take much nourishment. No history of syphilis could be obtained. Smears from throat swabs verified the diagnosis of Vincent's. I started him at once on a line of treatment that I have found effective—i. e., a strong solution of pot. chlorate, powdered alum, carbolic acid, glycerin and water, to be used as a gargle, and locally the ulcerated surfaces, after cleaning, were swabbed with a saturated solution of methylene blue in alcohol. He was given K. I. in large doses. This is always administered in the writer's cases, whether a history of syphilis is obtained or not. Blood count showed a moderate leucocytosis. He failed steadily in spite of all our efforts and died about two weeks after I saw him. The larynx was not involved in this case. I forgot to mention that salvarsan was used both locally and intravenously without any appreciable effect. We did not succeed in getting an autopsy.

I wish also to report two cases, fortunately not fatal ones, in babies aged fourteen and eighteen months. I have never before seen the disease in children as young as this, although we learn from the literature on the subject that it occurs at all ages.

As these two cases were practically identical clinically, although occurring in different families, I will report them

together. In both, the first indication that there was anything wrong was the refusal to take nourishment. The throat findings in both cases were similar. Both children had moderately large tonsils covered with a pseudomembrane, in appearance very much like a diphtheritic membrane. This could be fairly easily removed, and underneath, the surfaces of the tonsils were covered with a superficial ulceration. One of the unusual features of both cases was the extensive involvement of the glands of the neck. There is often some adenitis, but in these cases the cervical glands were very large and tender to the touch. There was a trace of albumen in the urine, which is, of course, a fairly common thing in all anginas. There was very little temperature. Throat cultures were taken and examined for both diphtheria and Vincent's. A clinical diagnosis of Vincent's had been made, mainly on account of the typical odor, which we find in all cases. No Klebs-Loeffler bacilli were found, but numerous fusiform bacilli and some streptococci. A spray of potassium chlorate, powdered alum, carbolic acid, glycerin and water was used, and in five days, with this treatment alone, the throats in both cases were entirely clear. Throat swabs were again examined at this time and no Vincent's organisms found. This combination of old drugs, in spray form, for children too young to use gargles, and as a gargle for older children and adults, is extremely valuable for the mild cases. The strength of the solution varies, of course, according to the age of the patient.

The cases just reported are the type that clinically resemble diphtheria more closely than the other forms of Vincent's.

TREATMENT.

The good results following the use of arsenic in some form are so well known now that it is only necessary to mention that salvarsan, used locally or intravenously, is very valuable in the severe cases. Hubbard, in a recent article, speaks of the value of iodoglycerole, very much like the old glyceride of iodin recommended by Mayer and others in the treatment of this disease. I have used the solution but have not found it as effective as some other local measures, such as a saturated solution of methylene blue in alcohol (also advocated by Sluder). I have always thought that the alcohol does as much good as the anilin dyes, and, as a matter of fact, experiments

have shown that a twenty per cent solution of alcohol will kill practically all throat organisms.

Hubbard, in the paper before mentioned (*Trans. Amer. Laryngol. Asso.*, 1917), also mentions the value of cacodylate of sodium. Another one of the arsenic group, enesol, an arsenate of mercury, used hypodermically, has been highly recommended by Halsted. The writer has had no experience with this preparation. Its action is probably very much like that of salvarsan, which is certainly valuable, particularly if followed by iodid of potash in increasing doses. Locally, I have found a solution of potassium chlorate, powdered alum, carbolic acid, glycerin and water to be one of the most effective methods of treatment. Pure alcohol swabbed on the ulcerated surfaces is also extremely valuable. I have found the greatest difficulty in having the severe cases get enough nourishment, because the pain in swallowing is often so great. A solution of orthoform in olive oil, swabbed on the ulcerated surfaces before meals, affords a certain amount of relief. A spray of carbolic cocain, in the worst cases, gives more relief than anything else, if used a few minutes before meals. In some of the adult cases of the ulcerative type, we are probably dealing with a combination of syphilis and Vincent's, even when we fail to obtain a history of syphilis. That may be one reason why salvarsan acts so promptly in some cases, although the concensus of opinion would seem to prove that the arsenic preparations do have a specific action. I have seen cases of this kind in which there was a positive Wassermann (with no syphilitic history), with the typical clinical and microscopic evidence of Vincent's.

XXXIX.

FURTHER OBSERVATIONS ON THE RADICAL
TREATMENT OF PERITONSILLAR ABSCESS.

By CLEMENT F. THEISEN, M. D.,

ALBANY.

In a paper giving the report of an epidemic of acute infection of the throat with abscess formation (Trans. A. L. A., 1916), the writer reported forty-four cases of peritonsillar abscess occurring in that epidemic. In fourteen of these cases, after a dissection backward toward the capsule of the tonsil, to locate the pus, the upper lobe, which had been loosened by the dissection, was removed. This leaves a large opening for drainage, and the cases so operated upon cleared up much more quickly than when simply the usual incision was made.

Ballenger, I believe, was one of the first to suggest a dissection backward toward the capsule in cases of peritonsillar abscess. The pus is present very soon after the attack begins in the majority of the cases, and we often fail to reach it early in the case, because we do not cut deeply enough toward the capsule. Atypical cases with very little pus and great swelling, edema and inflammation of the surrounding parts, presenting the clinical picture of a typical peritonsillar infection, occur, but they are fairly exceptional cases. In the vast majority of the cases the pus is present, but sometimes difficult to locate when it is confined between the body of the tonsil and the superior constrictor muscle. It is in this class of cases, particularly, that Barnes, in his paper on the radical treatment of peritonsillar abscess, recommends dissecting out the tonsil early during the acute stage. He has reported excellent results in a number of cases.

We frequently see cases so late that, owing to the great edema and inability of the patient to separate the teeth, it is difficult to find the usual anatomic landmarks.

In this class of cases the writer has not attempted the removal of any part of the tonsil during the acute stage. When the infection has gone so far as this, the pus is reached with-

out difficulty almost anywhere in the peritonsillar region.

Since the paper above referred to was published the writer has used the method described at that time—i. e., the removal of part of the tonsil after reaching the pus, in twenty cases, and the complete removal in sixteen. These were all suitable cases, seen early, before there was much swelling and difficulty in opening the mouth. The majority of the cases occurred in adults, and this is, of course, the rule in most peritonsillar abscesses. They do occur, however, and not so very infrequently, in children.

In the series of cases reported in my paper in 1916, forty-four in all, four occurred in young children.

Five of the thirty-six cases, reported in the paper read today, occurred in children, and were operated upon under ethyl chloride anesthesia. They were all very nervous children, and could not have been easily managed under local anesthesia. All the adult cases were operated upon with cocaine and adrenalin. When possible, I think it is safer to use local anesthetics in these cases, particularly when there is considerable edema filling up part of the throat. I have found, and that is probably the experience of most of us, that as soon as the mouth gag is inserted, after the patient is practically under the anesthetic, he begins to act badly. The same is true to even a greater extent of cases of retropharyngeal abscess in young children.

Barnes, in the paper before referred to (Trans. A. L. A., 1915), speaks of the danger of pulmonary infection from inspired pus, when a general anesthetic is used. He has performed a complete tonsillectomy in his cases on about the third day, and has had no complications of this kind. His cases all got along very well indeed, with no more distress than when the tonsil is removed under normal conditions. He has not found, when care is taken in dissecting out the tonsil with as little bleeding as possible, that there was any spread of the infection. The possibility of the aspiration of pus is of course largely done away with when local anesthetics are used.

The operation the writer has performed in selected cases, when the edema of the surrounding parts is not too great, is as before stated, a capsular dissection of the tonsil backward

until the pus is reached, and then the immediate removal of the part of the tonsil that had been loosened by the dissection.

There is no reason why the entire tonsil should not be taken out at the time, and this was done in my last sixteen cases. There is surprisingly little discomfort after the operation, and the relief following the much more thorough drainage than is afforded by the ordinary incisions is much greater and more prompt. I have not found that this operation, performed during the acute stage, is attended by any increased risk of a spread of the infection, particularly if care is taken to perform the operation with as little bleeding as possible.

The ordinary incision is often attended with much more bleeding and cannot be as readily controlled. When we bear in mind that in a peritonsillar abscess we are really dealing with an infection which soon involves the entire sinus tonsillaris, the risk of causing a more extensive septic process by our operative procedures need not be considered very seriously. Even if this were not so, the great relief following the operation so promptly is well worth the slight risk.

The ordinary incision, unless it is very free, closes very easily, and has to be kept open by packing or by stretching with a forceps every day. Patients as a rule object to this very much more than to the more radical operations, at least that has been the writer's experience. The abscess cavity, unless it is very superficial, drains badly after the ordinary incision, and not infrequently further abscesses form after the patient is apparently well. A tonsil is never perfectly normal after a peritonsillar infection, and in many cases the so-called "quinsy habit" is established, with an attack once or twice a year. The tonsils must eventually come out, and their removal, in selected cases, as early as possible during the acute attack is a rational operation.

I will not report any individual cases, but would like briefly to report a case that really brought home to me the necessity of some more radical operation, in peritonsillar infections, than the simple incision, and started the method of treatment I have used since that time.

A young woman, aged twenty-five years, developed what appeared to be a slight tonsillitis, not follicular, with very moderate inflammation of particularly one tonsil. I gave her





an astringent gargle, told her to use ice, and did not expect to see her again. On the following day she appeared at my office again, stating that she had great pain in swallowing and was feeling much worse generally. The inflammatory process was now confined to the left tonsil, with very little swelling, nothing to suggest a peritonsillar infection. Her distress was so out of proportion to the findings that I decided to make an incision in the usual place. I did not strike any pus. This was repeated every day, punctures and incisions being made in different places, for four or five days, and no pus was found. The patient was getting more discouraged all the time, and I did not blame her. She could swallow nothing but liquids, with great difficulty. During all this time the swelling increased only very slightly, and clinically the condition could not have been called at all typical of a quinsy.

I was about on the point of advising the patient to get another doctor, when it occurred to me that she probably had a deep collection of pus, a very small abscess cavity. I then grasped the tonsil with a forceps and carried my incision directly back toward the capsule, and entered a very small abscess cavity containing very little pus. The dissection was completed and the upper half of the tonsil removed, and in a few days we were both happy.

I suppose we have all had this same experience many times, and do not reach the pus the first time simply because we do not go back far enough toward the capsule. I am speaking now only of atypical cases, such as the one reported, and cases in which we fail to reach the pus during the first few days after the onset of the infection.

CONCLUSIONS.

The radical method of treatment for the quick relief of the distressing symptoms was used in thirty-six selected cases, in twenty of which the part of the tonsil that had been loosened by the dissection in reaching the pus was removed at the time. In sixteen cases a complete tonsillectomy was immediately performed after the pus was evacuated.

The operation is performed as early as possible, usually within two or three days after the onset of the attack, and in selected cases. In cases in which there is so much edema of

the parts that the anatomic landmarks cannot be easily determined the radical method was not attempted.

In this type of cases the inability to separate the teeth is usually so great that the radical operation would be very difficult. Local anesthesia, because of the possibility of the aspiration of pus under general anesthesia, is always used except in young children.

The risk of a spread of the infection is so slight, and has never been experienced by the writer, that there is no reason why a complete tonsillectomy should not be performed in every suitable case, at the time the abscess cavity is opened.

The cases reported in this paper were all unilateral abscesses, but the writer has used the same method in bilateral cases, which are fortunately not as common.

No unfavorable symptoms occurred when both tonsils were operated upon. As a matter of fact, the pain in swallowing after the operation does not last much longer, and the case runs about the same postoperative course as when the tonsils are removed under normal conditions. There is at times some temperature, particularly in children, and the tonsillar fossæ get back to normal conditions rather slowly.

XL.

SYPHILITIC NECROSIS OF THE INTERMAXILLARY
BONE.*

BY LIEUT.-COL. CHAS. W. RICHARDSON, M. D.,

WASHINGTON, D. C.

In a long clinical experience covering a period of thirty years I have seen the evidences of syphilitic infection of the upper air tract in almost every phase, stage and variety in which it is wont to appear in this region. The case which I shall describe this day, while being a tertiary necrosis and therefore not unusual in the life history of syphilis, presents several points of extreme interest—that is, the manner of its onset and the area of bone infected.

Mr. M. F., age twenty-six years, married, stock broker's clerk, consulted me first on April 16, 1917, on account of extreme pain in the lower third of the left nasal cavity. The family and general medical history as given by the patient seemed to have no bearing upon the case. The pain was described as being continuous, localized in the floor, over the lower portion of the inferior turbinate, and on the extreme lower portion of the septum near the floor. This symptom was present only in the left nasal chamber. The pain was so intense as to cause interference with sleep. The patient in no sense described the pain as greater at night. There was no alteration of function within the left nasal chamber. No symptoms other than pain and interference with sleep were complained of by the patient. The pain had already endured for several months. The young man had been under other special care before he came under my observation. He said that his former physician had stated that his condition was due to a spur of the septum, which was forthwith removed, without giving relief.

Physical Examination.—Investigation of the nasal chambers

*Read before the American Laryngological Association, May 27, 1918.

through anterior and posterior rhinoscopy revealed practically no deviation from the normal in the appearance of mucosa in either nasal cavity. Tenderness was especially marked in the lower anterior portion of the left nasal chamber, and particularly in the floor of the nasal chamber in this region. Careful examination of the incisor teeth demonstrated slight tenderness but no evident disease. Sinuses were transilluminated, special regard being paid to the left antrum, with negative results. The patient was referred to a roentgenologist for examination of the condition of the incisor teeth and the contiguous portion of maxillary bone. A negative report was received. As all other possible sources of such pain with negative objective symptoms had been eliminated, the patient was ordered to have a Wassermann made; with a double plus result. As the alveolar border over upper incision had become so intensely painful and so tender to the touch, I had these teeth extracted. The patient was immediately put upon salvarsan, but a little too late to spare him the destruction which had evidently started in before he came under my observation.

The destruction to which I refer was the complete necrosis of the intermaxillary bone on both sides. Shortly after removal of the teeth the evidence of necrosis began to be patent along the lower margin of the alveolar border in this region. In the course of several weeks, the whole mass of bone giving evidence of having separated, it was gently grasped with forceps and removed as one piece. By this time the patient had received three intervenous injections of salvarsan.

The important and salient feature in this case is, first, the severe, continuous pain for many weeks without any objective signs. Second, the severe necrosis, with the formation of complete sequestrum without any inflammatory swelling, and third, the complete limitation of the necrosis within distinct anatomic borders.

XLI.

TWO CASES OF UNUSUAL WOUNDING OF THE
LATERAL SINUS.

BY VIRGINIUS DABNEY, M. D.,

WASHINGTON, D. C.

These two cases do not show an anomalous position of the sinus so much as an unusual place for its wounding.

E. D., twenty-two years old, a very robust young girl, of excellent habits, in whom no tuberculosis or syphilis could be demonstrated, gave a history of a discharging ear for the past ten years, perhaps longer. The fetor was marked, the tympanic membrane totally destroyed save a crescentic fragment at the upper and outer quadrant, and the ossicles all gone. For the past few weeks she had had severe frontal headache and an evening temperature as high as 100° F. The classical Schwartze-Stacke operation was done, and a well developed pneumatic mastoid uncovered. A smooth walled cavity, presumed to be the antrum, and certainly placed where it was proper to expect it to be, was found, and supposed to have been somewhat exenterated, as is frequent in chronic discharging middle ear cases coming to operation. In curetting the roof of this cavity a gush of dark blood appeared, and the typical hemorrhage of a sinus wound followed. Subsequent examination of the part showed that there had been apparently a parietal thrombosis, which had organized and left a small channel in the upper part of the horizontal limb. The pressure of the cholesteatomatous mass had caused an erosion of the organized clot as well as of the bony groove. This was plainly visible after the operation was concluded. Of course, the true antrum was a mere slit wedged in between the bridge and the sinus, as is so often seen in anomalous cases. After two years there has been no middle ear discharge, and it is perhaps fair to conclude that the operation is a success.

E. L., a thoroughly unhealthy, septic boy of thirteen years of age, looking specific but giving no positive evidences of

syphilis or tuberculosis, had had a discharging ear as long as he could remember. The discharge was constant and of great fetor; the drum showed a large central perforation, and the ossicles were all present in part, about two-thirds of each being absent. Cholesteatoma could be seen in the tympanic cavity. The usual radical operation was begun, but on elevating the insertion of the sternomastoid muscle from the mastoid tip a profuse dark colored hemorrhage occurred and was most disconcerting so early in an operation. As often as pressure was removed the flow of blood returned. The area was packed off, and the operation completed, working above and around it. The flap was cut and left unsutured at the lower angle. Three days later I attempted to clear the tip, but was only partially successful. However, at the next attempt, two days later, the whole tip was removed, the remaining open skin and flap parts being freshened and united. The last two operations showed that the pressure of the cholesteatoma and the erosive effect as well, perhaps, of the discharge had opened a large area in the cortex, through which the sinus had protruded and become adherent to the periosteum and tendon of the muscle.

It is worthy of note that neither sinus was infected, though both were opened in the presence of cholesteatomatous masses and a streptococcal infection, and that both cases seem to be dry and healthy still, two years after operation.

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XLII.

DIGEST OF AMERICAN AND ENGLISH OTOLOGIC
LITERATURE FOR THE YEAR 1917.

BY OTTO M. ROTT, M. D.,
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I.—Relation of the Ear to General Diseases.

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10. Cary, E. H.: Aural Phenomena, the Result of Unusual Influence. *South. M. J.*, Nashville, 1917—X—249.
11. Eagleton, Wells P.: The Importance of Aural Symptoms in the Early Diagnosis of Tumor of the Cerebellopontine Angle. *J. Am. M. Ass.*, 1917—LVIII—333.
12. Ide, Clarence E.: The Relation of Obstruction of the Eustachian Tube to Local and Systemic Conditions and to Prognosis Regarding Restoration of Hearing. *Laryngoscope*, St. Louis, 1917—XXVII—14.
13. Fraser, J. S., and Muir, Richard: The Pathology of Congenital Syphilitic Disease of the Ear. *J. of Laryngol.*, Lond., 1917—XXXII—8.

Emerson¹ discusses the place of specialism in association with the whole general field of medicine and presents a very

complete list of the various pathologic conditions in other branches of medicine which may be due to lesions of the ear, nose and throat.

Beck² and Pollock³ believe that the pathologic changes in the bony capsule of the labyrinth in otosclerosis are analogous to the bony changes in osteomalacia, and report good results in the treatment of otosclerosis by the hypodermatic injection of adrenalin. In some cases the extracts of the adrenal, thymus and pituitary glands were given. While the claim is not made that the condition improves, the authors assert that by injections of 1/1,000 adrenalin solution from one to fifteen minims, in gradually increasing doses, the otosclerotic process has shown a tendency not to progress.

From a histopathologic study of the internal ear in cases of typhoid fever, purpura hemorrhagica and epidemic cerebrospinal meningitis, Tanaka⁴ has found the following changes:

1. In typhoid fever there was evidence of otitis interna or neuritis acoustica.
2. In purpura hemorrhagica there were hemorrhages in the internal ear.
3. In epidemic cerebrospinal meningitis there was found hemorrhagic purulent inflammation in the middle and internal ear, and the case in question proved that in this disease inflammation of the labyrinth may occur as a result of blood infection.

Bane⁵ reports a case of true diphtheritic acute purulent otitis media of both ears, in a patient of seventy-two years. The otitis media went on to the chronic stage, as is usual in this infection.

Wilcutt⁶ offers a case report of complete unilateral deafness resulting from acute parotitis, but no attempt is made to discuss the pathology or to locate the primary lesion, whether it is in the middle or the internal ear.

Dench⁷ draws attention to the rôle played by influenza in causing aural complications. He says that these otitic complications are nonspecific, as in almost all cases of so-called influenza otitis the infecting organism is the streptococcus and rarely the bacillus influenzae. What the influenzal infection does is to lower the general bodily resistance.

Palen⁸ believes that the percentage of systemic infections

from aural conditions is equally as large as is that from the tonsils or the sinuses and teeth, the actual increase in number of systemic infections from the latter being due to the greater number of sinus and teeth foci in comparison to the aural diseases. Infection from aural conditions take place: (1) By drainage into the throat through the eustachian tube; (2) through the blood or lymph systems; (3) by extension to surrounding structures, the general infection resulting from the secondary condition; and (4) by formation of a secondary focus.

Weinstein⁹ reports two cases of otitis media as a complication of pneumonia. One was a baby, the other a child of two and a half years. In both cases the pneumonia had apparently cleared up, but the patients continued to run a septic temperature. An aural examination showed a perfectly normal drum, and there was no pain in the ears. But to eliminate a possible ear complication an incision was made in both ears in each case. In both cases pus was liberated and a pronounced drop of temperature took place. Both patients made a rapid recovery.

Cary¹⁰ cites several cases with pain in ears and mastoids, tinnitus, deafness and dizziness, which were of a reflex character, the source of irritation being in some instances a spasm of the ciliary muscle of the eyes, relieved by properly selected glasses, and in others an impacted tooth.

Attention is directed to the importance of a knowledge of the distribution of the fifth, seventh and ninth nerves.

The author's explanation of the mechanism whereby tinnitus aurium, closure of the eustachian tube, retracted and hyperemic drum and pain in the ear are produced by chronic ciliary spasm, is quite interesting and instructive, opening up as it does a field of thought too frequently left untilled by the otolaryngologist:

"The tonic spasm of the ciliary muscle required an enormous number of impulses over the third nerve, hence the sympathetic control became involved in harmonizing these extraordinary demands. The impulses of the sympathetic through the otic ganglion became involved, and certain nerve

fibers, such as the branch to the tensor palati, tensor tympani, and levator palati, lose their control.

"For instance, the normal eustachian tube is partially closed and is opened in two ways: First, by the act of swallowing when the tensor palati and levator palati muscles open it for air to equalize a partial vacuum produced by swallowing a part of the air in the upper pharynx; secondly, the sense of atmospheric pressure from without is the signal for pressure to be equalized from within, and this sense acts as a stimulus to the nerves controlling the tensor palati and likely the levator palati, which then respond by opening the eustachian tubes. These muscles are under sympathetic control; the motor root of the fifth through the otic ganglion goes to both the tensor tympani and the tensor palati. Hence an immediate effect of disturbed impulses would be inactivity on the part of these muscles, the tensor palati influencing the opening of the tube directly, the tensor tympani indirectly, through relaxation of the tympanic membrane. Then the levator palati becomes involved in its activity through the blunting of the senses of necessity. So the eleventh is not active. The air in the tubes and middle ear is more or less absorbed and then we have negative pressure; then the ninth nerve distribution through the otic ganglion becomes disturbed, either directly as the fifth through the sympathetic, or it does so through negative pressure and relaxation of the vessels. Consequent hyperemia brings about further closure of the tubes, with pain radiating throughout this nerve's distribution. It is distributed to the oval and round windows of the internal ear and in several ways could disturb the labyrinthian circulation, bringing about dizziness. And it is conceivable that the mechanism can be from a point of irritation through any of the ganglia."

Eagleton¹¹ dwells on the importance of aural symptoms in the early diagnosis of tumor of the cerebellopontine angle, and cites two cases illustrative of his theme. One case was an endothelioma springing from the dura, causing great compression of the cerebellum in which aural symptoms were present for years before general symptoms of tumor were manifest. The other case was a small tumor with a large secondary cyst of cerebellum, causing great hydrocephalus in which during life spontaneous nystagmus was absent and vestibular

reactibility was at times present and again absent.

The aural manifestations of cerebellopontine angle tumor are: (1) Progressive deafness, beginning with a disturbance of the proper relationship between the degree of hearing and the tuning fork reaction, especially the duration of the bone conduction to the degree of deafness, and ending in (2) total deafness; associated with (3) loss of vestibular reactivity of the affected side; and during the time that the vestibular apparatus is still functioning (4) a gradual readjustment of the vestibular apparatus of the contralateral as well as of the homolateral side is taking place, which is manifested by (a) a reduction or even a temporary abolition of its reactivity to the cold caloric (at least, when applied in the upright position); (b) an absence of the vertigo and vomiting which normally accompany the induced nystagmus from the cold caloric, and (c) absence of spontaneous pointing deviations. As the cerebellar cortex becomes affected, however, may be added (5) spontaneous nystagmus; (6) spontaneous pointing deviations, and (7) absence during an induced nystagmus of the normal pointing deviations of the hemolateral side.

Ide¹² mentions various general conditions which give rise to tubal obstruction. General conditions, such as gout, syphilis, intestinal toxemia, and acidosis are mentioned, as well as certain drugs, such as quinin and the salicylates. Focal infection from teeth, tonsils and sinuses also give rise to tubal obstruction.

Fraser and Muir¹³ make an excellent contribution to the subject of congenital syphilitic ear disease. After reviewing the literature, they give a detailed report of the microscopic examination of both ears and summarize the changes found in their case:

1. Chronic adhesive process in the tympanic cavity, especially in the upper parts. The submucosa is greatly thickened, and shows cystic spaces filled with mucopus, but there is no perforation of the tympanic membrane.
2. Ankylosis of the malleus (and incus on the right side) to the external attic wall.
3. Necrosis and exfoliation of bone from the posterior-superior wall of the external meatus.
4. Invasion of the labyrinth capsule from the deep layer

of the swollen and infiltrated submucous tissue of the attic, aditus and antrum, and to a less extent from the submucosa of the lower part of the tympanic cavity.

5. Marked changes in the marrow surrounding the labyrinth capsule, of the nature of a chronic osteomyelitis. These changes in the marrow are continuous with the inflammatory process, spreading in from the deep layer of the submucosa of the middle ear. The marrow around the labyrinth capsule shows marked leucoblastic reaction, while that in immediate contact with the cartilage bone of the labyrinth capsule is converted into granulation tissue and shows numerous giant cells but no caseation.

6. Erosion of the bony capsule of the labyrinth by the phagocytic marrow to such an extent that the inflammatory changes reach the endosteum of the labyrinth, especially in the region of the three semicircular canals.

7. Filling up of the perilymph space of the canals by granulation tissue which contains giant cells, and compression or obliteration of the endolymph space in these regions.

8. Obstruction of the endolymphatic aqueduct as it passes through the bone to the posterior cranial fossa.

9. Great dilatation of the membranous labyrinth.

10. Formation of new connective tissue in the scala tympani.

11. Secondary degenerative neuritis of the nerve structures of the membranous labyrinth.

12. Slight small cell infiltration within the arachnoid sheath at the fundus of the internal auditory meatus (meningitis).

The authors conclude that, in their opinion, the changes in the membranous labyrinth and in the nerve ganglia are secondary to those in the middle ear and labyrinth capsule, and that otitis media plays a much more important part in the production of congenital syphilitic deafness than has hitherto been supposed.

II.—Hearing Tests.

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Perception Deafness.) *Annals. of Otol., Rhinol. and Laryngol.*, St. Louis, 1917—XXVI—31.

Downey¹ condemns the usual method of making the Rinné test by comparing the duration of air conduction with the duration of bone conduction, but insists that instead of this method we should determine

1. Whether or not air conduction is normal.
2. Whether or not bone conduction is normal.
3. In which course of sound conveyance lies the defect, or the greater defect, in hearing.

In other words, the Rinné test should be made as recommended by the Eighth International Otological Congress, 1909, by a separate test of air and bone conduction and the result recorded accordingly.

The reason for this is because the decrement of the vibrations of a tuning fork is not uniform from second to second, but is much more rapid at the beginning than near the end, for the reason that the amplitude decreases by geometric progression.

The practical significance of this is that in all tests, with all tuning forks the duration of the perception, both abnormal and normal, must be determined and noted, and the difference in time between the defective and normal perception of the duration of the vibrations, and not the duration of perception itself, taken as the factor of importance and the one which must serve as the index of defective audition.

The whole matter is summarized as follows:

1. By both air and bone conduction it is necessary that we have some index which will indicate the intensity under which a tuning fork is heard, and the simplest way to obtain a factor of this description is by comparing the abnormal duration of perception with the normal duration of perception and taking the difference between the two as the significant indicator.

2. As the energy necessary to make a tuning fork heard by bone conduction is markedly greater than the energy necessary by air conduction, the normal duration of perception of each is different; therefore, we may not directly compare the one with the other, but we must make separate tests of each course of sound conveyance.

3. Conduction deafness shows:

- (a) The Weber reaction referred to the ear complained of or said to be the deafener;
- (b) The bone conduction for the C² fork equal to or greater than the normal in duration of perception;
- (c) The air conduction for the C² fork reduced in duration of perception as compared to the normal;
- (d) The air conduction for the C fork reduced in duration of perception as compared to the normal, and to a greater degree than for the C² fork;
- (e) The air conduction for the C⁵ fork normal in duration of perception.

4. Perception deafness may be considered complete when the field of hearing is as follows, assuming that the lesion is unilateral.

- (a) Weber referred to the better ear;
- (b) Bone conduction for the C² fork is negative, the good ear being suppressed with the noise apparatus;
- (c) Air conduction for the C² fork is negative, the good ear being suppressed with the noise apparatus, and the C² fork, stimulated to its greatest intensity, is not heard by the stethoscope method;
- (d) Air conduction for the C fork is negative under conditions just described (c);
- (e) Air conduction for C⁵ fork is negative, the good ear being suppressed with the noise apparatus.

5. Between the labyrinthine and eighth nerve affections the following differential points are offered:

- (a) If the intralabyrinthine structures are completely involved, there is total deafness both by bone and air conduction;
- (b) If the intralabyrinthine structures, excluding the nervous elements, are but partially involved, there is deafness by bone and air conduction, but as a rule the degree of deafness will be greater by air conduction than by bone conduction;
- (c) If the nerve itself is involved, the deafness will be total in high degree of neuritis, both by air and by bone conduction;
- (d) In partial acoustic neuritis the bone conduction will be reduced out of all proportion to the air conduction.

6. Partial labyrinthine deafness shows:

- (a) Weber usually referred to the better ear. At times to the bad ear in cases showing but slight reduction in bone conduction;
- (b) The bone conduction for the C² fork reduced at least ten seconds in duration of perception, usually from one-half to two-thirds the normal duration;
- (c) The air conduction for the C² fork negative or markedly reduced in duration of perception;
- (d) Air conduction for the C fork negative;
- (e) Air conduction for the C⁵ fork negative.

7. Partial nerve deafness shows:

- (a) Weber referred to the better ear;
- (b) The bone conduction for the C² fork greatly reduced or negative in duration of perception;
- (c) The air conduction for the C² fork better in duration of perception, or reduced to the same extent as the bone conduction for the C² fork;
- (d) The air conduction for the C fork of good perception duration in recent cases, reduced markedly in old cases, but never negative;
- (e) The air conduction for the C⁵ fork reduced in duration of perception or negative.

III.—Vertigo and Vestibular Tests.

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Mackenzie's¹ observations on after-turning nystagmus in one hundred and seventeen cases are not in accord with those of Bárány. The author presents tables showing where his findings disagree with those of Bárány, and he offers the explanation that Bárány's technic was inaccurate. Whereas Bárány found wide discrepancies in the duration of after-turning nystagmus in normal individuals, Mackenzie found the duration more constant, the average duration being twenty-four seconds as against forty-one seconds mentioned by Bárány.

Concerning the value of the galvanic method of testing the functions of the inner ear and eighth nerve, Mackenzie² offers the following conclusions:

1. That the galvanic test is more accurate than either the caloric or rotational test in determining the function of the semicircular canals.

2. Besides being more accurate, the galvanic test is the least annoying to the patient, the most sensitive, and the easiest to control of the labyrinthine tests.

3. That the galvanic test can be applied as a unilateral test of semicircular canal function in all sorts of pathologic conditions, which is an advantage that cannot be conceded to the caloric.

4. That the galvanic test is applicable to cases of suspected unilateral labyrinth suppuration with obstruction in the external canal where the caloric may fail.

5. That the galvanic test is a unilateral quantitative test of semicircular canal function, which is a distinct advantage over the rotational test which at best is a bilateral test.

6. That the galvanic test is the only one whereby a differential diagnosis between labyrinth destruction, pure and simple, and eighth nerve neuritis can be made.

7. That the galvanic test is the only one for testing the function of the eighth nerve in cases of neuritis or in cases of secondary degeneration following destruction of the inner ear.

8. That the galvanic test is the only test available for determining the progress of eighth nerve neuritis, whether favorable or unfavorable.

From a study of the static labyrinth in twenty-eight cases of positively established syphilis Downey³ states that the most characteristic reaction is a lowering and confusion of all responses, varying from the totally dead labyrinth, giving no responses, to the cases showing all the normal reactions reduced in degree. For example, the nystagmus will last but ten to fifteen seconds or less, and will show fine oscillations in which the slow and quick components cannot be easily differentiated. Vertigo is absent, or it lasts but a few seconds. Falling is not definite. The patient, if tested quickly after rotation, will past-point with one arm, and not with the other, or will only past-point for a few inches, or will past-point incorrectly. The responses may be intensified by increasing the stimulation; thus, nystagmus may be absent after ten turns in twenty seconds, to become evident for some seconds after ten turns in ten seconds. Douching with water at 68° F. will bring on the same reduced or confusing reactions after a much longer period than the normal forty seconds, or it may require much colder water to bring out any response. Furthermore, it is apparently possible in these cases for one semicircular canal of the same ear to be more affected than the other; hence we may get all normal responses from rotation with the head in the upright position (horizontal canals), and no reaction with the head forward (vertical canals), or vice versa.

Increased irritability of the static labyrinth, crossed past-pointing and complete reversal of past-pointing has also been noted. The responses frequently vary from time to time.

In any case of vertigo Jones⁴ urges that the first thing to be done is to examine the ear mechanism which is responsible for the vertigo, just as we examine the urine in nephritis or

diabetes, or as we have a Wassermann test made in cases or suspected syphilis. Only rarely does a "dizzy case" remain obscure after these ear tests, and in most instances the diagnosis becomes clear and simple. The vestibular tests will reveal either normal or abnormal responses. If the responses are abnormal, the tests will help to locate the point of the disturbance, either within the ear itself or along its pathway within the brain. If the responses are normal, the diagnosis is narrowed down to (1) a purely functional neurosis, (2) ocular disturbance or (3) an evanescent toxemia, the source of which must be searched for.

Jones⁵ cites how the vestibular tests may be of value to the different specialties:

(a) Value to the General Practitioner: Vertigo means a disturbance of the equilibratory apparatus, and just as tests are made for nephritis, syphilis, etc., the ear tests enable one to know the reason for vertigo and the diagnosis is clearer.

(b) Value to the Otologist: In a case of deafness these tests give a positive data of the functioning of the internal ear. In tests for hearing, one never knows whether or not the labyrinth is destroyed, but here the new tests are valuable.

(c) Value to the Ophthalmologist: Nystagmus can be produced in various directions by the different ear tests. The eyes may be caused to dance violently if there is caries of the bone in outer wall of the labyrinth producing a fistula into the internal ear, or if the stapes is unduly mobile in the oval window and a Politzer bag is applied, causing pressure or suction. These tests are practical in the study of eye palsies and spontaneous nystagmus, which cause is not easily determined when the lesion lies not near the surface.

(d) Value to the Syphilologist: The early diagnosis of syphilis is not always easy but very important, as prognosis depends on how quickly the treatment is given, and a Wassermann test is not always absolute. Ear tests are valuable in the impairment of the eighth nerve function. It occurs a few weeks after primary infection, and in beginning involvement of the central nervous system, as the nervous system is infected in five per cent. The eighth nerve is very vulnerable to this disease, and an analysis of the intracranial pathways from the eighth nerve demonstrates a beginning involvement of

the nervous system several years before it can be detected by other methods.

(e) Value to the Neurologist: The differential diagnosis between the labyrinth and the intracranial lesions. The neurologist wants an eye test, and the otologist must be ready with his ear tests, which will give more definite information than the eye.

(f) Value to the Surgeon: The diagnosis of intracranial localization is a most difficult one, and the ear tests have proven valuable in locating lesions. And they may be helpful in preventing unnecessary operations. No brain should be opened without information from ear tests.

Jones and Fisher⁶ describe in considerable detail their technic, and present an illustration of their chart, in which all the tests are outlined in the order in which they are usually undertaken, and which is so arranged that when properly filled in, it shows all the vestibular data simply by a glance at one page.

One side of the chart is devoted to miscellaneous details or such routine matters as are found on any chart, with particular emphasis on the examination of the cochlea. The other side is devoted exclusively to the vestibular tests, of which there are three divisions: (1) Spontaneous, (2) Turning, (3) Caloric. The spontaneous phenomena of nystagmus, vertigo, pointing and falling should be searched for first and properly noted. Next the induced phenomena by the turning and the caloric tests are to be studied and recorded.

Before drawing conclusions, the authors urge the importance of proper technic, so as to make sure that the proper stimulus was applied, and offer the following points to be remembered:

- (a) The desirability of testing only one set of canals at a time;
- (b) In the turning chair only those canals are tested which are in the horizontal plane;
- (c) The caloric test affects only those canals which are in the vertical plane;
- (d) Each canal when stimulated, produces a nystagmus and a vertigo in its own plane;
- (e) The eyes are always drawn in the direction of the

endolymph movement (this is the slow component);

(f) The vertigo is always in the direction opposite to the endolymph flow.

First the turning tests are made. By tilting the head forward thirty degrees, the horizontal canals are placed exactly in the horizontal plane. During the turning the patient's eyes are closed. The chair is rotated to the right ten times during twenty seconds, then stopped. The patient is told to open his eyes and look off at a distance, when the "after-turning" nystagmus is noted, including its direction, character and duration. In a similar manner the patient is turned to the left.

In testing the past-pointing after turning, the patient is again turned, but twice as fast, namely, ten times in ten seconds. Eyes are kept closed. When turning is over, the patient's right hand is quickly grasped, and after his forefinger touches the examiner's finger, the examiner says "up," upon which the patient raises the arm in question to the perpendicular and immediately tries to come back to the examiner's finger. The degree and direction of the past-pointing is recorded, taking each hand separately until both hands touch the examiner's finger.

In the caloric tests, water at 68° F. is employed. The vessel containing the water is placed about two feet above the level of the ear to be examined. Patient's head is placed thirty degrees forward so as to have the vertical canals in the vertical plane. Patient looks toward the floor, and the time it takes to induce nystagmus is recorded. The direction and amplitude of nystagmus is noted, and immediately the tests for past-pointing are made once with each arm.

Other tests are sometimes made for special conditions, but not for routine work.

Fisher⁷ defines vertigo as a conscious sensation perceived within the brain when perfect equilibration is interfered with, and draws attention to the close relationship between vertigo and the internal ear, explaining the value of the new ear tests in determining the cause of vertigo, no matter what its type or origin.

Vertigo may be of two kinds: First, experimental or induced vertigo produced by the turning, caloric or other tests which cause an artificial stimulation of the vestibular end

organ, and, second, vertigo resulting from disease, which occurs whenever there is an interference with the perfect balance between the static organs on each side. The important thing to remember is that it is always a disturbance of the ear and its associated pathways that can result in vertigo and nothing else. When remote organs produce vertigo it is only because they definitely influence the ear mechanism.

Vertigo may be caused by:

1. Lesions within the internal ear, such as labyrinthitis of the various types, or effusions or hemorrhage within the internal ear.
2. Toxemias affecting the ear or other portions of the vestibular apparatus, such as ptomain poisoning, constipation, alcoholism, nephritis, gout, rheumatism, syphilis, the infectious fevers, etc.
3. Definite lesions along the pathways from the ear, within the brain itself, such as tumor, hemorrhage, infarct, thrombus, abscess, gumma, tubercle.

Weisenburg⁸ discusses vertigo as found with intracranial tumors, tumors of the cerebellopontine angle, tumors of the cerebellum, as well as functional vertigo and epileptic vertigo.

Shambaugh,⁹ in discussing the vertigo which is due to primary disease of the labyrinth, offers the following conclusions:

1. Primary disease of the labyrinth produces attacks of vertigo whenever the vestibular apparatus is involved by an acute process;
2. Hemorrhage into the labyrinth is much less common than was formerly supposed;
3. An embolus lodging in the labyrinthine artery occurs especially in caisson workers, as the result of gas emboli, and gives rise to the characteristic Ménière syndrome.
4. Syphilis in the secondary and tertiary stages, as well as in hereditary syphilis, not infrequently involves the internal ear and gives rise to vertigo;
5. Neuritis of the eighth nerve from overdoses of drugs, such as quinin, tobacco and alcohol, may produce neuritis of the eighth nerve with the Ménière syndrome.
6. Toxic neuritis of the eighth nerve as the result of infectious fevers frequently gives rise to attacks of vertigo;
7. The most frequent occurrence of vertigo is in connection

with a primary chronic degenerative process involving the peripheral neurons of the eighth nerve and occurring independent of syphilis or the infectious fevers;

8. The probable cause for many of these cases is to be found in a neuritis of the eighth nerve, as the result of some chronic focus of infection, such as is so frequently seen in chronic disease of the faucial tonsil;

9. Attacks of vertigo occurring in connection with acute articular rheumatism are the result of neuritis of the eighth nerve and a symptom of the systemic infection from some primary focus.

Kerrison¹⁰ takes up that phase of vertigo due to suppurative labyrinthitis. There are two clinical types: (1) The vertigo of the onset or acute stage, and (2) the vertigo of the latent or quiescent stage.

The vertigo of the acute stage is accompanied by the following invariably associated phenomena: Spontaneous vestibular nystagmus; subjective sensation of the rotation of surrounding objects in the plane of the nystagmus, and tendency of the patient, if standing, to fall or move in the plane of the nystagmus and in the direction opposite to that of the quick eye movement.

IV.—Diseases of the External Ear.

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2. Mathers, R. P.: Vincent's Disease of the External Ear Occurring in the Course of Chronic Middle Ear Suppuration. *J. Laryngol.*, etc., London, 1917—XXXII—159.

Dean and Gittins¹ report a case of bilateral congenital osseous atresia of the external auditory canal in a patient fifteen years of age, with an exceptionally good functional result following operation. Where before operation the whispered voice was heard at two inches, after the operation the whispered voice was heard at forty feet. Following a simple mastoidectomy, the thick wall of bone between the mastoid cavity and glenoid fossa was removed externally to the con-

cave depression in the concha. Thiersch grafts were used.

An extensive review of the literature accompanies the case report.

Mathers² reports a case of Vincent's disease of the external ear. After applications of boric acid fomentations for two days the membrane disappeared. A few weeks later a radical mastoid operation was performed without any complications.

V.—Nonsuppurative Diseases of the Middle Ear.

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Heller¹ reports a case of catarrhal deafness in which the etiologic factor was a gumma in the fossa of Rosenmueller. There were no other symptoms and no history of syphilis. Antisyphilitic treatment caused a disappearance of the growth and the deafness.

Dworzak² considers the catarrhal adhesive process and otosclerosis suitable for radium therapy. The therapeutic object is to stop the rapid progress of the disease, to lessen if possible the head noises, to eliminate the disagreeable head symptoms, and if possible to improve the hearing. Both the radium rays and the radium emanation are used. The application is made directly in the tympanic cavity. The amount of radium varies from one to ten mgm. radium element. The radium tubes are applied by means of the radium applicator and are centered in the ear by means of the head band, to which is

attached a small ear speculum, by which it is possible to introduce and remove the applicator and to watch the reaction. A brass filter eliminates the alpha and beta rays, and the therapeutically active gamma rays penetrate the tympanum and middle ear. Besides this, a large amount of radium is employed to ray the entire ear region. The author considers the effect of the radium to be purely destructive here in eliminating the proliferating pathologic tissue, and partly in a selective action on the terminal nervous ramifications. The radium emanation is manufactured in an emanator of special construction. Out of the tank oxygen bubbles through the liquid in the bottle which contains the radium in solution. The quantity of this oxygen is nicely regulated. The oxygen takes up the radium emanation and can be used for inhalation by means of a mask or in a room, for the activation of water for drinking purposes or for the treatment of the ear directly in blowing it through the eustachian tube in the middle ear. In the latter case the author employs the pressure of the oxygen alone or combines the emanator with the Meyer-Rowan instrument, so that sound waves or air under pressure will force the emanation into the tympanic cavity. At times the patient inhales the radium emanation, and he also inflates the eustachian tube by Valsalva's test. In all cases it is necessary to remove the excess radium emanations after treatment by means of suction from the external auditory meatus or by pressure through the eustachian tube or both combined, for radium emanation remaining in the middle ear could ultimately cause damaging after-effects. Radium D, one of its products of decomposition, lasts sixteen years, and might remain active too long in the middle ear. The radium emanation acts like a strong and active ferment, and therefore it deserves a prominent place in the treatment of internal diseases. In the course of the treatment three phases can always be recognized: 1. The pathologic symptoms become more severe and general unrest is exhibited by the patient. 2. Later a constant euphoria sets in, and all the symptoms of disease disappear. 3. Finally, a supersaturation seems to arise, with insomnia and unrest, occasionally accompanied by the old pathologic symptoms. An intermission in the treatment causes a disappearance of these symptoms in a few days.

The author cites four cases out of fifty-three similarly treated by the above method. In almost all the cases he found either an improvement or a complete cure—in twenty-two cases—of tinnitus. In twenty-four cases there was striking improvement; in seven cases there was no reaction whatever. The rest of the patients—four—left town before treatment was completed.

Brown³ has found that hot air and calomel vapors are superior to any other form of eustachian, aural, catarrhal and other inflammations of the mucous membranes. For catarrhal deafness he uses a gentle current of hot air, which is projected into the nose, and the patient directed to swallow every few moments. Where the eustachian tubes are obstructed they are inflated with hot air. Calomel vapors are then applied to the nasal chambers or directly to the middle ear. Two to three grains of calomel are sufficient for the nasal treatment.

Robinson⁴ supplements the local treatment for catarrhal deafness by a season of Spa treatment. Inflations of medicated vapors are used as well as tympanic massage. The electric therapeutic lamp applied by approaching to, or removing the lamp from, the ear from moment to moment, has given good results. The lamp should be employed daily during five minutes.

As the sclerosis of the ossicles in the ear is in many instances merely a local expression of a rheumatic, gouty or rheumatoid arthritic condition, these general dyscrasias should receive their appropriate general therapy.

Hays⁵ has brought the surgical art to his aid in the treatment of catarrhal deafness. The author's procedure is to make an incision between the auricle and the temporal bone in the natural fold present there. The incision extends from the upper pole of the auricle downward to the top of the mastoid. This incision is deepened until the periosteum of the mastoid is reached, when the dissection is continued downward along the posterior cartilaginous wall to the junction of this cartilaginous wall and the bony canal wall. An incision is made at this point of conjunction, and the auditory canal is incised for about two-thirds of its circumference. The auricle and deeper tissues are thrown forward and held in position with a sharp retractor. With a sharp chisel the small

ledge of bone overhanging the superior canal wall is chipped away, thus giving a full exposure of the drum, which is only three-eighths of an inch away from the severance of the canal. To incise the drum, the incision is begun in the upper portion of Shrapnell's membrane posteriorly, and continued along the circumference of the drum to the anterior quadrant. A flap of the drum thus made is thrown forward over the malleus. Through this opening the operator's work is carried out. The author has operated on two cases of catarrhal deafness, but what the ultimate outcome will be remains to be determined.

Watson-Williams⁶ reports a case of chronic adhesive otitis, in which myringotomy and partial ossiculectomy was performed, with excellent immediate results. Under gas anesthesia, the author made a crucial myringotomy on left ear. Immediately after recovery from the anesthetic, the patient's hearing had improved from thirty-eight inches to seven and one-half feet for whisper. One month later the hearing was twenty-four feet, at which time the left membrane was more freely excised and the lower half of the handle of the malleus removed. In the discussion which followed this report, the consensus of opinion was that the ultimate result in these cases is far from what the immediate result would lead one to expect.

Emerson⁷ presents some new and interesting views concerning the treatment of chronic secretory otitis media. His conclusions are:

1. That every case of chronic progressive middle ear deafness has a primary focus, which persists as a low grade infection, subject to acute exacerbations. In chronic cases such foci are usually multiple.
2. Such primary focus is usually constant for the individual, and is indicated by the location of exacerbations.
3. Every case showing variable hearing can usually be improved up to their best hearing or more.
4. Socalled cases of nerve deafness of nonspecific origin are, in the experience of the writer, due to toxemia from some definite focus.
5. Inflation in chronic cases is unscientific and harmful as a routine, as the tube is already open and has partly lost its

tone in the majority of cases; and in those cases not open, it does nothing to remove the cause.

6. Nasal obstructions do no harm to the middle ear unless infection is present. Such obstructions, however, are the primary cause in the development of imperfect drainage, which predisposes to infection, and which is always present in cases of chronic secretory otitis media originating in the nose.

7. Foci whether in the sinuses, tonsils, mandible or epipharynx, are potential factors in the progress of chronic progressive otitis media, either by direct extension or through the lymph and blood streams.

8. No hearing test will forecast the improvement in a given case as long as we have a positive Rinné with variable hearing.

9. Whatever the macroscopic appearance of the membrana tympani, the cause of the deafness is active for a long time outside of the middle ear as a toxemia, or low grade infection subject to acute exacerbations.

10. Constitutional diseases have but little effect upon the course of chronic secretory otitis media, except to lower the patient's resistance and make him more susceptible to exacerbations of his localized focus or foci.

VI.—Suppurative Diseases of the Middle Ear and Mastoid.

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Pierce¹ mentions the following factors as influencing the treatment of otitis media:

1. The location of the area of the middle ear involved—that is, whether the disease is more or less located in the tube, the tympanum or the mastoid.
2. The stratum that is involved—that is, whether it is relatively superficial, the epithelial structures being most affected, or the tissue under the epithelium, or whether it is the periosteal layer and bone.
3. The character of the pathologic process—that is, whether it is merely a pus producing microorganism, being a streptococcus, staphylococcus, or one of the various forms of diplococci, whether it occurs as a result of diphtheria or scarlet fever or of tuberculosis or syphilis.

Each case must be studied to determine which of the above factors is operating, and then the treatment is obvious.

Where the tube is the part chiefly affected, the therapy should be directed to the tube and nasopharynx. As regards other types, nonoperative procedures, such as cleansing and astringent measures, are sufficient as long as the disease is limited to the mucous membrane.

Jones² reports a case of facial paralysis complicating an acute otitis media, in a boy five years of age. Ten days after incising the bulging membrana tympani the paralysis had disappeared. The author is inclined to believe that such an occurrence is due to the projection of the swollen mucosa into the fallopian canal through a dehiscence rather than to the simple pressure of the exudate against the membrane covering such a deficiency.

Durkee³ reports a case of mastoiditis with a complicating cervical abscess which ruptured into the throat. The efforts to locate the opening in the throat were unsuccessful.

Keeler⁴ reports two unusual cases of mastoid disease with severe complications, which recovered after operation.

The first case was one of chronic mastoiditis, complicated by a palsy of the left facial nerve, an unresolved unilateral bronchopneumonia, pericardial effusion with adhesions to the parietal pleura and bilateral suppurative cervical adenitis. The interesting features are:

1. The preservation of the stapes and the remarkable resistance of the labyrinth to the prolonged infection which caused so much destruction of the surrounding tissues.
2. The facial nerve did not become involved until the ear had discharged continuously for more than one year.
3. An unusual vaginal infection with Gram negative intracellular diplococci. Patient was three years old.
4. The heart and lung conditions existed at the time of admission.
5. While the temperature was highest and the pulse the most frequent, there was present a distinct cervical, glandular, suppurative process.
6. The bronchopneumonia and the heart lesion were apparently not unfavorably influenced by the administration of ether.
7. The fortunate external rupture prevented possible intracranial complications.
8. The facial paralysis and the consequence disfigurement will be constant reminders of the evils of procrastination.

The second case was one of bilateral mastoiditis in an eighteen months old baby, complicated by a bilateral bronchopneumonia and circumscribed meningitis. This case presents the following interesting features:

1. Double bronchopneumonia concurrent with bilateral mastoiditis terminated in recovery only in a few reported instances.
2. The meningitis was fortunately circumscribed and was not purulent, as the examination of the spinal fluid, one day after the operation, showed.
3. The case teaches the importance of examining both ears.

In this patient the right one had been overlooked.

4. The value of rapidity of operation on cases of this serious character cannot be overestimated.

5. No matter how hopeless the patient, suffering from middle ear disease with mastoiditis may be, and no matter what complications may be present, it is good surgery to operate and relieve the pressure as soon as possible.

Boot⁵ reports two cases of hemorrhagic mastoiditis in which the mastoid cells at operation were found filled with dark clots, the streptococcus being the infecting organism. The onset was severe. The discharge was a bloody serum and was profuse. The mastoid tenderness was very marked and the temperature was moderate. There was considerable leucocytosis.

Keiper⁶ reports a case of acute mastoiditis in a four-year-old boy with leucocyte count of over 60,000. At first there was only trouble in one mastoid, which was opened. Later, because the pulse rate was high, out of proportion to the temperature, more trouble was suspected, and found in the other mastoid, which was opened. At the time the left mastoid was opened there was suspicious symptoms from the right, but because of a negative X-ray report, this mastoid was not operated at that time.

Freudenthal⁷ reports a case of mastoiditis developing after prolonged nasal packing for epistaxis, but the interesting feature was the necessity for doing a mastoid operation in a patient suffering from diabetes. Urinalysis revealed 4.4 per cent sugar plus acetone. The operation was performed quickly under gas anesthesia, just enough done to give free exit to pus. The outcome was extremely gratifying. The author considers the psychical condition a very important factor in major operations, as it undoubtedly was in this instance. The patient did not know that she was suffering from diabetes nor from a mastoid infection. She was told that an abscess had to be opened. The patient slept almost constantly for twenty-four hours after the operation; one-fourth grain of morphin had been given before.

Salinger⁸ reports two cases of subperiosteal abscess of the mastoid, which were cured by paracentesis. One was in a boy four years of age; the other, in a child twenty-two months of age. The potent factor, in the cure by this method, was a

Durkee³ reports a case of mastoiditis with a complicating cervical abscess which ruptured into the throat. The efforts to locate the opening in the throat were unsuccessful.

Keeler⁴ reports two unusual cases of mastoid disease with severe complications, which recovered after operation.

The first case was one of chronic mastoiditis, complicated by a palsy of the left facial nerve, an unresolved unilateral bronchopneumonia, pericardial effusion with adhesions to the parietal pleura and bilateral suppurative cervical adenitis. The interesting features are:

1. The preservation of the stapes and the remarkable resistance of the labyrinth to the prolonged infection which caused so much destruction of the surrounding tissues.
2. The facial nerve did not become involved until the ear had discharged continuously for more than one year.
3. An unusual vaginal infection with Gram negative intracellular diplococci. Patient was three years old.
4. The heart and lung conditions existed at the time of admission.
5. While the temperature was highest and the pulse the most frequent, there was present a distinct cervical, glandular, suppurative process.
6. The bronchopneumonia and the heart lesion were apparently not unfavorably influenced by the administration of ether.
7. The fortunate external rupture prevented possible intracranial complications.
8. The facial paralysis and the consequence disfigurement will be constant reminders of the evils of procrastination.

The second case was one of bilateral mastoiditis in an eighteen months old baby, complicated by a bilateral bronchopneumonia and circumscribed meningitis. This case presents the following interesting features:

1. Double bronchopneumonia concurrent with bilateral mastoiditis terminated in recovery only in a few reported instances.
2. The meningitis was fortunately circumscribed and was not purulent, as the examination of the spinal fluid, one day after the operation, showed.
3. The case teaches the importance of examining both ears.

In this patient the right one had been overlooked.

4. The value of rapidity of operation on cases of this serious character cannot be overestimated.

5. No matter how hopeless the patient, suffering from middle ear disease with mastoiditis may be, and no matter what complications may be present, it is good surgery to operate and relieve the pressure as soon as possible.

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patent squamomastoid suture. The author points out that in fifty per cent of all children less than two years of age, there is a patent squamomastoid suture, and this, together with the remarkable resistance of the drum membrane in young children as compared to adults, explains the occurrence of a subperiosteal abscess without rupture of the drum membrane, and even with preservation of the landmarks.

However, this method of procedure is advocated only in acute cases, where the drum has not been perforated and the middle ear drained, or where the perforation is inadequate, and then only with the proviso that there be no other threatening symptoms that would indicate necrosis in the mastoid adjoining other vital structures, such as the lateral sinus, the dura or the middle fossa, or the labyrinth. Furthermore, where drainage through the tympanic membrane has been effected, and the fluctuation and edema of the mastoid fail to promptly disappear, there can be no question as to the necessity of immediate incision into the bone.

Schreiber⁹ reports a case of salivary fistula following a simple mastoidectomy with a cervical abscess, and draws attention to the anatomic position of the parotid gland and the structures which it harbors.

Dighton¹⁰ reports a case of complicated Gradenigo's syndrome, in which there was paralysis of the right external rectus muscle, though the left ear was the one diseased and operated. The right ear was normal, but there was a history of a "one-time" suppuration in it. The only explanation given is that a reflex action had lighted up an old standing focus of disease in the right ear, and so caused a neuritis of the sixth nerve on that side.

Shambaugh¹¹ reports a case of suppurative otitis media with paralysis of the external rectus which persisted for eight months. The involvement of the sixth nerve was due to necrosis of the apex of the petrous portion of the pyramid.

Kerrison¹² contrasts the mastoid operation of ten years ago and of today in reference to the bone operation, the treatment of the soft parts and the after-treatment.

Concerning the aditus, formerly the simple establishment of drainage was sufficient; now it is considered necessary to remove granulations, as they may mark the site of a focus of

disease in the underlying bone, and if not removed may perpetuate the tympanic lesion. Excessive scraping of the bone is condemned in that it is injurious to the minute blood vessels within the bone, as a result of which repair is retarded until the vascular supply is reestablished. Bone vitality may even be injuriously affected. The author criticises the pressure of tight gauze packing, as delicate new granulations and capillaries are destroyed at each change of dressing.

Dench¹³ discusses the indications for the mastoid operation in acute otitis media, under the following headings: Pain, temperature, local tenderness, otoscopic examination, bacteriologic examination, duration of the inflammatory process, course following acute symptoms, history of repeated incisions, impairment of hearing, involvement of the static labyrinth, meningeal symptoms and roentgenoscopy. The signs indicative of the operation are: Persistent and severe pain for from twenty-four to forty-eight hours after free incision of the drum membrane; a persistent high or remittent temperature; recurring tenderness over antrum; bulging of upper and posterior portion of the drum membrane with a sinking of the corresponding meatal wall, especially if still present ten days after the inception of the acute infection; sudden cessation of discharge with coexistent canal signs; profuse discharge for more than three weeks after a paracentesis; toxemic symptoms dating from an acute otitis media; history of repeated incisions of the drum; profound impairment of hearing coexistent with acute otitis media; labyrinthine and meningeal irritation.

The value of the X-ray and the bacteriologic examination is mentioned.

If the infecting organism is found to be a *streptococcus capsulatus* the patient needs careful observation and should not be discharged until the hearing has been restored to the condition existing before the infection and all canal signs have disappeared.

Carter¹⁴ reports an interesting case of gas bacillus infection in a chronic mastoiditis. In incising the deep layers of the skin, gas escaped in fine bubbles. This edematous, emphysematous tissue was one and one-half inches thick. Then when the periosteum was incised there was an almost explosive

discharge of foul-smelling gas. The interesting features of this case are:

1. The rarity of gas bacillus infections of the mastoid.
2. The unusual route through which the infection traveled, namely, through the middle ear; the usual mode of entrance of the bacillus into the body being through an open wound or abrasion into which earth had been ground.
3. The prompt recovery following the operation, an unusual sequel to gas bacillus infections, for these cases usually succumb very quickly.

In considering the etiology of chronic suppurative otitis media, Clay¹⁵ states that besides the cases which are chronic from the start because of the nature of the causative agency, as, for instance, a tuberculous or a luetic infection, and those which are chronic because of the general debilitated condition of the patient, there are local etiologic factors which render an otherwise simple or acute otitis a chronic one. Such factors are some local nasal or nasopharyngeal abnormality, as septal deformities, hypertrophied turbinates, nasal polyps, collapse of the alæ nasi, chronic suppurative disease of accessory sinuses, diseased adenoids, adhesive bands in fossa of Rosenmueller and diseased tonsils.

Dwyer¹⁶ reports that in fifty-three cases of chronic suppurative otitis media, he has found the *staphylococcus pyogenes aureus* seventeen times; the *staphylococcus pyogenes albus*, six times; the *streptococcus mucosus*, eight times; the *streptococcus hemolyticus*, eight times; *pseudodiphtheria* (Hoffman's and Xeron's), fifteen times; *pyocyanous*, sixteen times; *proteus*, five times; *Klebs-Löffler*, once, and the *bacillus mucosus capsulatus*, three times.

As to the information to be obtained concerning the nature of the process by means of cytologic examination of the discharge, the author states that evidence of granulation tissue is afforded by the presence of leucocytes of all kinds, large and small mononuclear and polymorphonuclear, normal and degenerated, but especially by lymphocytes, which are very numerous, while epithelial cells are not uncommon. Bone disease may be marked by the presence of myelocytes or osteoblasts, or chemical analysis shows the presence of an increased amount of bone salts. Cholesteatoma is indicated by the pres-

ence of cloudy packed squares, with or without bacteria, a distinction that may at first glance appear unnecessary, but is really of great importance, especially when the cells are of central origin, for a septic cholesteatoma in that situation affords a stronger indication for radical measures than a non-septic one.

Among chronic discharges is one which is very profuse, fetid, opaque and like cream. This is free from cells, either epithelial or septic leucocytic, but consists of throat organisms in an albuminous matrix—not true pus, therefore, but a polymicrobic emulsion. This indicates no granulation, hence measures to do away with the throat infection are indicated. The author concludes his paper with a glowing tribute to the efficacy of vaccine therapy, properly controlled.

Mackenzie¹⁷ states that the pathology of chronic middle ear suppuration depends upon the etiology, or the factors that have been at work to make the condition chronic, such as were mentioned by Clay.¹⁵ Of the strictly pathologic changes in the ear itself, the author mentions cholesteatoma, polypi, granulations, caries and necrosis.

Concerning the prevention of the chronic condition Mackenzie¹⁸ states that the factors which delay healing of the acute condition are the cause of the chronic process, hence these should be ascertained and properly treated if the chronic condition is to be prevented. The following are mentioned:

- (a) Adhesive bands in the middle ear spaces;
- (b) Narrowing of the eustachian tube;
- (c) Any obstruction to drainage;
- (d) Adenoids and diseased tonsils;
- (e) Nasal obstruction;
- (f) Tuberculosis and syphilis;
- (g) Any diseases of the kidneys, heart, lungs, gastrointestinal tract or elsewhere which tends to depreciate the patient's health.

Boone¹⁹ praises the value of the Roentgen ray in the diagnosis of mastoid disease, stating that an infected mastoid will show a distinct cloudiness.

Recognizing the difficulties in making a diagnosis of the atypical case of mastoiditis, which so frequently occur because of the variations in the anatomic conformation of the temporal

bone, Clevenger²⁰ draws attention to the importance of avail-
ing oneself of all the aids at one's disposal, as, for instance,
the nature of the infecting organism, the general resistance
of the patient, blood examination and X-ray plates.

Summarizing the factors to be kept constantly in mind as
essential to making an early diagnosis of mastoid disease, the
author mentions:

1. Anatomic differences which produce a variety of objective and subjective signs.
2. Color and position of the drum membrane.
3. Color and character of membrane covering the posterior bony canal wall over the antrum.
4. Character of the bacteria found in the discharge.
5. Skiagraphic findings.
6. Three points of tenderness, namely, antrum, tip and veins—sometimes absent, due to thick cortex.
7. Ordinary tests for middle ear deafness.
8. Indefinite cranial pain with slight rise of temperature following history of acute middle ear inflammation, with or without discharge.

Ingersoll²¹ makes a plea for the stereoscopic roentgenograms. A note on the technic by Hill and Thomas accom-
panies the article.

Hays²² reports a radical operation for tuberculous mastoiditis, under cocaine anesthesia.

The patient, aged twenty-four years, was given a preliminary injection of morphin, grain one-fourth, and atropin, grain one-one-hundredth, four hours before operation, which was repeated two hours later. At the time of the operation one-eighth grain morphin was given.

The site of the proposed incision was infiltrated with equal parts of ten per cent cocaine solution and adrenalin. The subperiosteal infiltration was with one-half per cent cocaine and adrenalin.

The practical points to be deduced from this case are:

1. That the radical mastoid operation can be done under local anesthesia without any pain.
2. That the superficial scalp tissues and periosteum are sensitive, but that bone has absolutely no sensation.

3. That the mucosa of the middle ear is extremely sensitive and must be separately cocainized.
4. That irritation or destruction of the facial nerve is immediately noticeable to the patient.
5. That the after effects are practically nil.
6. That the end result is just as good under local as under general anesthesia.

Brown²³ states that the orthodox treatment of suppurative conditions of the middle ear is hopeless. His paper is mainly an exposition of the theories and opinions of Chas. Heath.

Kaufman²⁴ states that the Heath operation is justifiable and gives good results in:

1. Chronic mastoiditis where there is only partial destruction of the tympanic membrane and the ossicles are in position.
2. In cases of acute mastoiditis with an unusual amount of destruction of the tympanic membrane and loss of hearing.
3. In cases of acute mastoiditis with extensive necrosis of the bony portion of the external auditory canal.

On the contrary, it should never be attempted where there is cholesteatoma, and it should never be done until all non-surgical methods, including vaccines, have been tried.

Barnhill²⁵ mentions the following factors as influencing the end-results of the surgical treatment of chronic suppurative otitis media:

1. Age of patient.
2. Condition of nose, nasopharynx and pharynx.
3. Nature and violence of the original aural infection.
4. The presence of complications at the time surgical measures are attempted.
5. The period of the disease in which the operative attempt to cure is made.
6. Physical condition of patient.
7. Skill and judgment of the operator.
8. Efficiency of the after-treatment.
9. Cooperation of the patient, particularly after discharge from the hospital.

The author closes with a statement (a) as to the effect on the hearing, concerning which no improvement is expected; (b) as to cure of the suppuration, which occurs in ninety per

cent of cases; (c) as to mortality, which is greater from delay than from the operation itself.

Welton²⁸ discusses the indications and results in the radical mastoid operation. As to indications he mentions:

1. Persistence of pain in the ear or over the mastoid process. Permanent or intermittent attacks of vertigo, due to erosion of the external semicircular canal. Marked cerebral disturbance.
2. The existence of a fetid suppuration for a year or longer and when local treatment to the middle ear for a period of three months has failed to cure.
3. Frequently recurring middle ear suppuration with preceding malaise, slight or severe headache, temperature and mastoid tenderness.
4. Where the disease is not limited to the tympanum and where operation is prophylactic against fatal results coming without signs of pus retention or visible inflammation of mastoid.
5. Where pain and mastoid tenderness supervene upon cessation of discharge, to be relieved when pus begins to flow.
6. Chronic suppurative mastoiditis.
7. An onset of acute mastoiditis during the course of tympanic suppuration.
8. Fistula of mastoid bone.
9. Cholesteatomatous formation.
10. Labyrinthine vertigo in old healed suppurative cases.
11. Necrosis of bone shown by X-ray.
12. A sclerosing or rarefying osteitis where such condition produces periodic attacks of mastoid pain after all signs of active trouble in the ear have ceased.
13. A narrowing or complete stricture of the external auditory canal which would lead to pus retention.
14. Facial paralysis.
15. Tuberculosis causing the discharge.
16. Any intracranial or sinus involvement or the presence of an oncoming general septicemia.
17. Neuroretinitis or choked disc in a patient with chronic suppurative otitis media.
18. Where it is desired to take out life insurance.

19. In children when there is necrosis in both middle ear and mastoid cells.

20. Children from five years up, with two years' suppuration, in whom there is increasing deafness.

As to the results in the author's series of twenty-six cases he writes that the average time for after-treatment, or until complete cessation of all discharge, was sixty-seven days. Shortest time, eight days; the longest, four and one-half months.

The hearing was improved in thirteen cases.

No change in ten and an increase in deafness in three patients.

In one case a facial paralysis developed after operation, but this is clearing up. This occurred in a woman aged forty-two years, in whom the suppuration had been present intermittently for ten years following scarlet fever.

The general health, almost without exception, has improved.

As to length of time of the discharge prior to operation, it is stated that the shortest period was four years; the longest, sixteen years.

Considering the end-results in one hundred radical mastoid operations, Stucky²⁷ discusses (1) the chronic discharge, (2) the hearing, (3) the general condition of health.

In all the cases but eleven, there was complete cessation of the discharge of pus. In these eleven cases there was occasional recurrence of discharge of mucopurulent material from the lower tympanic cavity, the result of a patent or patulous eustachian tube. Nineteen cases reported a slight improvement in the hearing, while sixty cases reported the hearing neither better nor worse. Twenty-one cases were sure that the hearing in the operated ear was worse. All of the cases reported complete relief of all head symptoms and greatly improved health.

Blackwell²⁸ reports his results in four cases of his modified radical operation for chronic purulent otitis media. Three of the cases were dry and have been so from three to nine months. In three cases the hearing has been improved since operation; in the fourth case it has remained about the same. In dressing these cases it is most important to prevent a thick plug of granulations from developing in the attic and antrum

regions, as it easily becomes infected and serves as a constant source of infection to the entire wound. The most satisfactory method of preventing this is to remove all packing from the canal at the end of a week—even removing the cotton plugs from the meatus—permitting the atmospheric air to freely enter the interior of the wound.

In order to determine to what extent the radical mastoid operation succeeds in accomplishing what it is usually performed for, Harris²⁹ asks: (1) What is the radical operation? (2) When is it indicated? The answer is, "The radical operation, applied to the ear means, as elsewhere in the body, an operation for the radical or complete removal of all disease, and is indicated when cure by other measures is found impossible." From this basis the author has analyzed the results of the operation on twenty-four patients concerning the discharge, the hearing, the epidermization and the condition of the tube. Concerning the discharge, it was found that 48 per cent were perfectly dry and 52 per cent were still discharging. Concerning the hearing it was found improved in only 8 per cent, unchanged in 20 per cent, and worse in 20 per cent. Concerning epidermization the ear was found fully epidermized in fourteen cases, partly in three, while granulations were found in five. Two cases were still under treatment, though the operation in all had been performed not less than five months previous. The tube was found closed in eleven cases.

As the above statistics represent the work of approximately a dozen operators with large experience, the author feels that it is representative of the usual experience.

Two reasons are offered for the failures in so large a percentage of cases: (1) Failure in determining the proper indications for the operation, and (2) faulty technic in the operation or in the postoperative treatment. As a result of this investigation the author has drawn the following conclusions:

1. The radical operation is an operation of undoubted merit.
2. It has been in the past, and is today, being performed often when not called for.
3. The results are by no means uniformly good, partial or complete failures occurring in a considerable percentage of cases.

4. Improvement in the hearing cannot be promised. The most that can be offered, in the light of our statistics, is that the hearing will not be altered, although there is sufficient risk of lowering or destroying it to warrant reluctance or refusal to operate in case the hearing in the other ear is destroyed.

5. While accidents, including facial paralysis, are met with in the course of the operation, they are not of sufficient frequency or significance to have any bearing upon a decision in regard to the operation.

To close the long standing perforations in the tympanic membrane, Dunlap³⁰ has successfully used Okuneff's trichloroacetic acid method in fifteen cases. A ten per cent cocaine solution was first applied and then the edge of the perforation was touched with a small probe wet with a saturated solution of trichloroacetic acid. All the cocaine should be carefully wiped away before using the acid, as the two combine and form a white precipitate. The vitality of the drum membrane should regulate the frequency of cauterization after the scar tissue has been sufficiently destroyed to produce granulations. In some cases it was necessary to use weaker solutions of the acid, as the saturated solution destroyed the new tissue. When such is the case, the cauterization should be made at intervals of from five to seven days.

Allport³¹ reports a successful closure of a perforation by the above method.

Curtin³² closed a postaural fistula by making a new incision three-quarters of an inch behind the fistula. The periosteum and skin were freed from the bone from behind forward to the fistula by a thin elevator. The edges of the fistula were freshened and united by two sutures. The gap in the posterior incision was covered by skin graft.

Newhart³³ presents a case report of a primary carcinoma of the middle ear, adding an extensive review of the literature.

Burton³⁴ presents a case report of an epithelioma of the middle ear and mastoid.

Ryland³⁵ advises the routine employment of lumbar puncture in all cases of acute infective aural disease upon which it has been decided to operate:

1. Because it is highly desirable to know (previous to any

operation upon aural disease which falls into that class of case under consideration) whether or not the spinal fluid is turbid.

2. Because, in certain instances, the tissue reactions fail, and the middle ear infection proceeds with great rapidity to an intracranial and meningeal infection.

3. Because it is probable that a certain proportion of these cases which begin to manifest signs of meningitis after an aural operation have been in reality cases of meningeal infection for hours, or even days, before an operation was performed.

4. Because lumbar puncture as a routine procedure would do much to establish the frequency of occurrence, and to inform us as to the type of case in which we are to expect occurrence of the condition known as meningitis serosa.

5. Because the procedure would afford a safeguard of some value to the reputation of the operator.

VII.—Intracranial Complications.

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Blackwell¹ presents the following conclusions from his study of thirty-five cases of perisinus and extradural mastoid abscess:

1. None of the patients showed any characteristic symptoms indicating the presence of a perisinus or extradural abscess.
2. All of the cases on aural examination exhibited the well known local clinical objective signs which would indicate to a trained observer the necessity for a mastoid operation.
3. X-ray examination cannot in all cases be relied upon to reveal the presence of an extradural or perisinus abscess.
4. In this series the complication occurred very largely in acute mastoiditis, of three or four weeks' standing, in young people of fifteen to thirty, and was associated with slight temperature reaction.
5. If operation be performed, the prognosis is good.
6. Accidental injury to the sinus, occurring during operation in perisinus and extradural abscess, renders the prognosis

serious. The only death in these thirty-five cases followed an injury to the sinus.

7. Finally, the complete mastoid operation, together with its after-treatment, results in the most rapid and satisfactory healing and in improved cosmetic appearance.

Calhoun² reports a case of epidural abscess over tegmen of antrum and middle ear which gave all the symptoms of brain abscess. The radical mastoid operation with exposure of the affected area resulted in cure.

Stone³ reports an unusual case of sinus phlebitis and discusses some diagnostic tests:

The unusual case reported by the author was that of a boy four and a half years old, in whom the presence of a sinus phlebitis was not recognized until there were undoubtedly symptoms of general sepsis, because of the total absence of any sign of ear or mastoid involvement. At the first examination, when the only symptom was vomiting, there was noticed a glandular swelling in the posterior triangle of the neck. A diagnosis of acute gastric indigestion was made. Three days later elevation of temperature was first recorded, and the patient was dull and photophobic. One week after the onset of the vomiting, the picture was that of a meningitis, and a lumbar puncture was made. Headache did not appear until the following day, and in the region of the swollen glands there was a puffy edema. On the next day the patient had a chill; temperature, 105 degrees. The swelling in the neck had extended upward over the base of the skull, reaching from the occipital protuberance to the mastoid. Just posterior to the mastoid, over the region of the emissary vein, there was considerable tenderness. An incision was made slightly posterior to the usual mastoid incision and extending downward over the swelling in the posterior triangle. Free pus was found in the latter region, and the bone over the sinus was found to be soft and necrotic. The mastoid cells and antrum were normal, with the exception of a few cells overlying the sinus. The sinus contained a clot, which was removed, but no free bleeding was obtained from the region of the bulb. The jugular vein, however, was not touched, as the condition of the patient was too serious. The patient died thirty-eight hours later.

After discussing the importance and difficulty in making a diagnosis of sinus phlebitis before onset of the complications of general sepsis or brain abscess, the author reviews the various tests supposed to determine any interference with the normal flow of blood through the sinus. They are:

1. The West-Beck symptom, which consists in the production of distension of the veins of the forehead and the fundus oculi on compression of the jugular opposite to the suspected lesion. The author considers this test almost worthless, as the effect is so transient and its recognition so dependent upon the personal equation of the observer.

2. Greisengers' symptom—i. e., swelling over the emissary vein of the mastoid. The author quotes authorities who state that in reality the puffiness over the emissary vein region is not a sign of venous obstruction, but is due directly to the presence of pus under the periosteum, and is therefore a late symptom, hence this also is an unreliable sign.

3. The recognition of a clot in the jugular on deep palpation over the vein. However, the danger of dislodging the clot and causing immediate death thereby, renders this test a very hazardous one.

4. Blood counts and blood cultures are of assistance in excluding other possibilities. A blood count is of aid in ruling out typhoid and malaria. The advantages of blood culture are thus set forth:

(a) With few exceptions, uncomplicated mastoid infections give negative blood cultures.

(b) With few exceptions sinus infections give positive blood cultures at some time during their course.

(c) The absence of bacteria in doubtful cases would lead one to hesitate to explore until the possibility of all intercurrent disease had been excluded. As regards treatment, the author favors exploration in doubtful cases, and should a clot be demonstrated, he favors preliminary ligation of the jugular vein in preference to resection.

Haeggstrom⁴ reports a case of scarlatinal mastoiditis, in a girl seven years old, with arrosion of the sinus wall on the sixth day after a mastoid operation, with a fatal termination. Autopsy revealed an opening, the size of a pea, in the wall of the sinus where it had been exposed at the operation.

McCoy⁵ reports a case in which suppuration from the jugular bulb persisted after the sinus operation and resection of the jugular vein. For this condition, the Tandler operation was selected as giving the easiest, simplest and safest method of reaching the bulb, and as most skillfully avoiding danger of wounding the surrounding vital structures. The steps of the operation are:

1. The mastoid incision and the incision for the jugular are converted into one. The sternomastoid muscle is separated for its entire length and pushed posteriorly.

2. The spinal accessory nerve is loosely tied with a suture, so that it may be in good view during the operation. The nerve is followed almost to its exit at the jugular foramen.

3. Passing the finger deeply into the wound, the space between the styloid process and the mastoid process is found, where the exit of the facial nerve through the stylomastoid foramen may be exposed.

4. The digastric muscle is separated from the digastric fossa and shoved forward and downward. By working on a line below the stylomastoid foramen and this muscle there will be no danger of injuring the facial nerve.

5. After pushing aside the digastric, the occipital artery may be ligated in two places and cut.

6. The jugular vein may now be separated from the margin of the jugular foramen, which can be felt with the finger. After pushing aside the periosteum at the base of the skull and the rectus capitis lateralis, the uppermost portion of the vein may be loosened.

7. The bone is now removed from the sigmoid sinus to the bony margin of the jugular foramen, and the sinus bulb and vein are split wide open.

Long⁶ reports a case of acute suppurating mastoiditis without tympanitis, with the complications of perisinus abscess, phlebitis and streptococcemia, with recovery following operation. The interesting features were:

1. The mildness of the primary infection—rhinitis.
2. The transmission of such virulent bacteria as streptococci from the nose to the mastoid cells without injury to any of the structures met during the journey.
3. The six days of severe pain and tenderness over the

mastoid region, then an abrupt cessation, due to a breaking through the mastoid boundary into the extradural space.

4. The extensive necrosis of the mastoid found at operation five days later.

5. The fact that no thrombus was found in the sinus, even in the presence of the classical symptoms of sinus thrombosis.

6. The uselessness of nasal douches and sprays as a prophylaxis of ear infection.

7. The tardiness in operating, due to absence of tympanic symptoms.

8. The slow convalescence, the patient having left the hospital twenty-three days after the operation.

Odeneal⁷ reports two cases of mastoiditis with fistulae leading to the sinus, and in one case with the presence of thrombosis, in the other with a normal sinus, but in both no symptoms leading one to suspect such an extension of the disease process as was found. These two cases illustrate how utterly impossible it is to always judge of the extent of a mastoiditis from a symptomatic standpoint.

Lewis⁸ reports a case of lateral sinus thrombosis, complicating an acute exacerbation of a chronic suppurating ear. The patient had been treated for malaria by a general practitioner. When operation was finally begun, and the periosteum was being elevated, there occurred a profuse hemorrhage from the middle ear, which later was found to be due to a rupture of the walls of the sinus above the thrombus. All the bony walls of the mastoid covering dura and sinus had disappeared. Patient finally succumbed from septicemia. The author draws attention to the mild nature of both the objective and subjective symptoms attending so much mastoid necrosis, together with an immense epidural abscess and extensive sinus thrombosis, and the absence of metastatic foci of infection during the whole three and one-half weeks of its course.

Glogau⁹ details a case which at the primary mastoid operation presented a perisinus abscess with apparently normal sinus wall. During the next few days there developed the septic fever curve, with chills and sweating, characteristic of sinus thrombosis, with negative blood cultures, although the pus from the mastoid showed pure streptococci. A week after the first operation, a second operation was performed and a

clot removed from the sinus after resection of the jugular vein, which was found thrombosed with inflammatory hypertrophy of the cervical lymph glands, although there were no changes around the neck pointing to this condition prior to the operation. After the jugular resection the sinus and bulb were laid open. Metastatic abscesses developed later but the patient eventually recovered.

Patton¹⁰ reports a cerebral complication suggestive of brain abscess which developed thirteen hours after the initial pain of an acute otitis media and three hours after the ear first began to discharge. In spite of brain explorations at two operations, during which nine punctures into the cerebral substance were made, no pus was found, but after each operation cerebral symptoms improved. Two weeks after the last exploration pus came from the wound for the first time. The author asks in what way if not by an abscess can the symptoms be accounted for? But no pus was found. Could the abscess have worked its way out through one of the incisions?

Coates¹¹ observed three cases of brain abscess of otitic origin, in only one of which was there any paralysis apparent, and this came on late in the disease. Neither were the mental symptoms more conclusive or helpful in establishing the diagnosis. In two of the cases the febrile reaction was marked; the pulse rate was rapid, at least commensurate with the temperature, as were also the respirations. With wakefulness and delirium rather than slow cerebration, and mental alertness instead of drowsiness, the absence of eye pressure symptoms or of paralysis, and in two of the three cases a concomitant meningitis existing, the diagnosis of a brain abscess was a difficult task.

Bernstein¹² reports two cases of cerebellar disease, one of which was an abscess complicating suppurative otitis media. The well known tests are mentioned, and particular emphasis is laid on the work of Jones of Philadelphia.

Clothier¹³ cites a fatal case of pneumococcic meningitis developing less than a week after an acute suppurative otitis media. During the entire course of the disease there were no signs of mastoid involvement, and the patient died before consent for the mastoid operation was obtained. Pneumococci were found in the aural secretion and in the spinal fluid.

Ryland¹⁴ reports a case of acute mastoiditis engrafted on a chronic suppurative otitis media, in which a perisinus abscess, and phlebitis of the lateral sinus wall were discovered, but, as the appearances were not in favor of an intrasinus clot, it was not disturbed. A little over a month later there were evidences of meningeal involvement. Lumbar puncture was performed three times in four days, a streptococcus was found, but patient recovered.

McKenzie¹⁵ advocates the use of an artificial cerebrospinal fluid for purposes of lavage in cases of otitic meningitis. The formula is:

Potassium chlorid	3.5
Sodium chlorid	1.5
Potassium carbonate.....	0.2
Glucose	2.0
Distilled water.....	100.0

This forms a stock solution, from which the fluid for use (specific gravity, 1002) is made up as follows:

Stock solution	10
Sterile distilled water.....	90

The salts should be dissolved in water and the solution boiled before the glucose is added, as boiling decomposes the glucose.

Syme's¹⁶ case presents the following interesting features:

1. The bone condition appears to have been an acute spreading osteomyelitis originating in an acute affection of the tympanum.
2. The sinus became infected probably by way of a communicating vein, as the wall contiguous to the bone was quite healthy.
3. Cerebrospinal fluid could be seen flowing into the sinus.

Maclay¹⁷ narrates a case of sinus thrombosis, following a blow on the ear. The explanation given is that the emissary vein was probably ruptured by the blow and thrombosis started in the sinus, which subsequently became infected from the diseased mastoid. Maclay¹⁷ also reports a case of temporo-sphenoidal abscess which was operated, and the patient was dressed and moving about the ward at the end of three weeks.

Ryland¹⁸ reports three cases of lateral sinus disease. The

points of interest in the first case were (a) the extradural abscess over the sigmoid sinus had made so much pressure as to force out all the contents of the sinus at this point, leaving a concave anterior wall against the posterior wall of the sinus. (b) In spite of the fact that the clot was not entirely removed from the torcular end of the sinus, the patient recovered. The interesting feature of the second case is the illustration of the fact that the course taken by acute infective disease of the middle ear tract may be, and nearly always is, much more dependent upon anatomic dispositions than upon the nature and virulence of the infection. The last case presented the following points:

- (a) The involvement of the sinus after an initial operation that appeared at the time to provide a very free drainage.
- (b) The virulent pneumococcal infection of the middle ear tract and finally of the subarachnoid system.
- (c) The clear and complete perforation of the sinus wall.

VIII.—Diseases of the Internal Ear.

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Shambaugh¹ draws attention to the fact that focal infection plays a rôle in the primary degenerations of the labyrinth, and reports four cases in which the tonsils were the seat of infection, from which the trouble originated. Three distinct types may be observed:

1. Where the cochlea alone is involved, producing nerve deafness and more or less tinnitus.
2. Where the vestibule is involved simultaneously with the cochlea, producing, as a rule, occasional attacks of vertigo in addition to the symptoms arising from disease of the cochlea.
3. Where the vestibular nerve alone is affected, and where all symptoms indicating disease of the labyrinth may be absent, except for possible occasional attacks of vertigo.

Yearsley² also discusses the question of the systemic infection of the internal ear of focal origin in such cases characterized by sudden attacks of aural vertigo, with or without deafness, as well as in such cases of nerve deafness, with or without tinnitus. These cases are differentiated from those of true Ménière's disease, in which the cause is a hemorrhage or effusion into the labyrinth. As probable sources of the infection, the tonsils, nasal fossæ, teeth and intestines are mentioned. Four cases illustrating this etiologic relationship are described.

Stein³ discusses the significance of sudden and profound deafness, not such types of deafness that present slight or only partial impairment of hearing, although possibly taking place suddenly, nor to such cases in which profound or absolute deafness ensues gradually from chronic changes in or about the hearing apparatus. The following conditions are mentioned as causing profound deafness, apparently suddenly:

1. Bleeding in the middle ear in a case of pernicious anemia.

2. Hemorrhagic effusions into the labyrinth.
3. Syphilis of labyrinth, eighth nerve or brain centers.
4. Diffuse labyrinthitis.

Graham,⁴ in discussing the cases of neuritis of the eighth nerve, refers to the multiplicity in the causes and in the variation of the symptoms. As etiologic factors are mentioned:

1. Pressure as from a tumor.
2. Serous meningitis from middle ear infection.
3. The effect of suppurative processes at the apex of the petrous portion of the temporal bone.
4. Toxemia from lues, lead, arsenic, alcohol and tobacco or from intestines.

5. Arteriosclerosis, heart lesions and nerve exhaustion.

This group of cases exhibits a partial or total, temporary or permanent, deafness which has a tendency to recurrence, during which the functional testing may give anything from a middle ear disturbance to that of the typical lesion of the internal ear. Accompanying this may be an apoplectiform disturbance of the vestibular apparatus, as exhibited by dizziness and disturbances of equilibrium, inequalities in the after-turning nystagmus, caloric and galvanic reactions, and interference with the kinesthetic sense. Either the cochlear or the vestibular symptoms may be uppermost, or one apparatus or the other affected separately, making the lesion as a whole overlooked or referred to other parts of the body, as is often the case when the patient is superficially examined. Nine cases are reported to illustrate the above contentions.

As to the diagnosis of serous labyrinthitis, Graham⁵ states that, with the exception of the fistula symptom, which is positive, there may be all the signs of a diffuse suppurative labyrinthitis. Where the fistula or other tests cannot be made, for fear of breaking down protective barriers, or where a diagnosis may not be made because of deafness and a nonreactive labyrinth, the clinical course would be the only guide. As long as there is no headache, and the fever ranges between 98.6 and 99.6, and the pulse remains around normal, and there is no marked variation in the blood picture, it is safe to let the patient alone. But should the temperature and pulse rise rapidly, accompanied by a marked headache, and the dizziness takes on a stormy character with vomiting, so that the

patient is unwilling to be moved at all, the labyrinth must be sacrificed and drainage established, even as far as the internal canal.

Two case reports are added.

In reference to the treatment of labyrinthine infections, Phillips⁶ states that the indications for operation depend upon the type of labyrinthine involvement, and that some of the conflicting opinions are due to the difficulties in satisfactorily determining the type present. Except in cases that already show that the infection has passed through the labyrinthine spaces into the meninges, the author feels that a moderate degree of conservatism should rule the action of the surgeon.

Nonsuppurative cases resulting from parotiditis, hemorrhage or other effusions, and epidemic cerebrospinal meningitis should never be subjected to operation. The labyrinth should not be operated upon in cases of serous labyrinthitis, and whenever any doubt exists as to whether the case is purulent or serous in character, the patient should be given the benefit of the doubt and the operation delayed, pending further developments. The acute diffuse labyrinthitis developing in chronic suppurative cases offer more hope of becoming circumscribed than when accompanying acute purulent otitis media. As the infection in these latter cases usually extends rapidly to the meninges, early surgical measures seem to be justified. Even when the meninges have become involved, there is still hope from prompt operative measures. The author reports a recovery from such a complication, stating that the Neumann operation is the ideal procedure. The paralabyrinthitis cases should be subjected to the mastoid operation, in order to prevent further erosion of the labyrinthine capsule. The circumscribed type of labyrinthitis should be subjected to the mastoid operation, but the intact membranous labyrinth should not be disturbed. Necrotic areas should be removed, but the operator should not go beyond the lines of demarcation.

In a later paper Phillips⁷ goes more into detail concerning classification, but his principles of treatment remain the same. He adds a word, however, concerning cases of latent labyrinthitis, where the radical mastoid operation is indicated per se. He advises that the radical mastoid operation should not

be performed in these cases of latent labyrinthitis without immediate exenteration of the labyrinth, because the shock which occurs during the performance of the mastoid operation is sufficient to light up a dormant process, which usually starts a meningitis or cerebellar abscess. As to classification, the author adds a new nomenclature for the serous and purulent types, calling them, respectively, mild and grave labyrinthitis.

The acute diffuse labyrinthitis complicating acute purulent otitis media, may be of two varieties: one occurring within the first three days of the middle ear inflammation, which is usually mild and does not extend to the meninges; the other, occurring six to ten weeks after the onset of the acute otitis media, and meningitis is a common and fatal complication.

In the acute stage of labyrinthitis, Kerrison⁸ advocates absolute rest in bed, as little local treatment as possible, and the avoidance or postponement of all bone surgery not otherwise imperatively indicated. In the quiescent, or latent stage, a radical operation, combined with careful surgical drainage of the labyrinth, is the only safe treatment. In each individual case surgical treatment must take account of the following points:

- (1) Immediate chances of recovery, with and without operation.
- (2) Possible influences of any operation in causing a spread of infection.
- (3) Stage of the disease in which operative intervention is safest.
- (4) Ultimate risk to life if the labyrinthine focus of infection is not surgically eliminated.

Rae⁹ presents a new classification for diseases of the labyrinth as follows:

1. Acute diffuse labyrinthitis. No distinction is made between serous and purulent, as in the very earliest stages these forms cannot be differentiated—in fact, the serous variety is very likely the first stage of the purulent, and, at best, the differential diagnosis is made on the results and not on the evidence.

2. Chronic diffuse labyrinthitis. This is the type formerly called latent, in contradistinction to the first or acute type, formerly called manifest.

3. Paralabyrinthitis—formerly the circumscribed: (a) With fistula; (b) without demonstrable fistula.

In discussing the differential diagnosis between purulent labyrinthitis and cerebellar lesions, Friesner¹⁰ mentions the following points:

1. Headaches, very rarely present in uncomplicated labyrinthitis, are invariably present in cerebellar lesions.
2. With cerebellar lesions there may be disturbance of the sensorium, disturbance of respiration, bradycardia, optic nerve changes, paralysis of cranial nerves, none of which, with the exception of disturbances in the eighth nerve and occasionally in the seventh, ever occur with labyrinthitis.
3. Vomiting, while present in both, is never projectile in type when due to labyrinthine disturbance, but always associated with nausea.
4. There is never much elevation of temperature in uncomplicated purulent labyrinthitis.
5. The spinal fluid is normal in uncomplicated labyrinthitis.
6. With cerebellar lesions there may be hypermetria, asynergy, adiakokinesis, tremor, disturbances in speech, atony or hypotony, catalepsy, hemiparesis, and fixed attitude of head. None of these occur with labyrinthitis.
7. As to the falling phenomena, the direction of falling is changed according to the position of the head—i. e., always toward the direction of the slow component, when of labyrinthine origin; direction of falling unchanged in cerebellar disease.
8. Deviation of extremities, past-pointing, has the same significance as falling.
9. In labyrinthine suppuration there is loss of hearing, loss of reaction to caloric, rotation, and fistula tests, etc. In cerebellar disease there is "enduring nystagmus."
10. Nystagmus, if vertical, points to cerebellar disease; otherwise it has localizing significance.

Rott¹¹ details the indications for the labyrinth operation. After citing in chronologic sequence the various opinions held on this subject by a representative body of otologists during the past decade, the author classifies these opinions as follows:

- (a) Ultraradical, when the labyrinth operation was advised

as soon as any form of labyrinthitis was diagnosed. Jansen was the exponent of this view.

(b) Radical, when the labyrinth operation was advised during the acute stage of diffuse suppurative labyrinthitis, as soon as the diagnosis was made, without waiting for evidences of meningeal involvement. Those who subscribed to this view were Freytag, Hinsberg, Bárány, Neumann, Ruttin, Urbantschitsch, Ballenger, Mackenzie, Whiting, Braun and Friesner, Dighton, Leidler, Perkins, and Campbell.

(c) Conservative, when the labyrinth operation was advised only when meningitis is threatened or present. Those holding this attitude are Dench, Uffenorde, Bárány, Kopetzky, Alexander, Kerrison, Shambaugh, Duel, Henninger, Danziger, Saunders, Phillips, and Broder.

(d) Ultraconservative, when no labyrinth operation was permitted during the acute stage. Blackwell is the exponent of this view.

Another interesting phase of the subject, and one which apparently has not been definitely settled, is the question as to the advisability of performing the radical mastoid operation in the presence of an acute diffuse labyrinthitis, without at the same time opening the labyrinth.

While the concensus of opinion, which in some instances is quite dogmatically expressed, is opposed to the practice of performing the mastoid operation in these cases without at the same time opening the labyrinth, because of the danger of setting up a fatal meningitis, there are a few men who throw the weight of their authority in favor of such a practice in certain instances.

Those who condemn this practice are: Hinsberg, Davis, Bárány, Alexander, Kerrison, Ruttin, Mackenzie, Brock, Whiting, Braun and Friesner, Ballenger, and Dighton.

Those who favor the practice under certain conditions are Burger, Duel, Dench and Broder.

Duel thinks it is all right in acute otitis cases, providing all concussion is avoided; and Dench states that the single operation is justified if the labyrinthitis is latent and there are no labyrinth symptoms.

Concerning the question of the danger of accidental dislocation of the stapes during the radical mastoid operation and

the bearing of this accident on the indication for opening the labyrinth, only three authors express themselves, namely, Hinsberg, Alexander and Kerrison. Hinsberg and Alexander advise immediate operation on the labyrinth in cases of labyrinthitis following operative trauma, while Kerrison goes one step further and advises the labyrinth operation as soon as the accident has been done, before the labyrinthitis develops. The reason given in each case is that the labyrinthitis which follows this accident usually gives rise to a fatal meningitis.

As to the course of procedure in the circumscribed variety, the concensus of opinion is in favor of the principle of non-operative interference on the labyrinth, excepting, of course, the ultraradical views of Jansen, who operates all cases, whether circumscribed or diffuse. However, Bárány, Neumann and Ballenger state that they would deem the labyrinth operation in circumscribed labyrinthitis justifiable, when the irritable labyrinth continued to give rise to periods of intense vertigo, as to incapacitate the patient from work. Here, particularly if the hearing in the other ear is good, destruction of the irritable labyrinth is advised.

From the study of the literature the author offers the following conclusions relative to the indications for operative interference on the labyrinth:

1. In acute diffuse suppurative labyrinthitis, the only time a labyrinth operation should be considered is when symptoms of meningeal involvement supervene upon those of the labyrinthine infection.
2. In any other type of diffuse labyrinthitis, no labyrinth operation, because of the labyrinthine condition *per se*, should be performed. If, however, the middle ear suppuration is of such a type as to present indications for the radical mastoid operation, then the radical mastoid operation should be immediately followed by the labyrinth operation.
3. The only conditions presenting labyrinth symptoms in which the mastoid operation alone is indicated are: (a) that condition of perilabyrinthitis in which the labyrinth itself has not yet become involved, and (b) the circumscribed variety of labyrinthitis, with the exception of those cases which continue to give rise to incapacitating symptoms of vertigo and

in which hearing in the other ear is good. In this condition the labyrinth operation is indicated.

4. Should the stapes be dislocated accidentally during the radical mastoid operation, or should appearances of the labyrinth capsule (as pus exuding from oval window) at this time first draw our attention to the possibility of a labyrinthitis, then the safer course would be to open the labyrinth at once.

Critically reviewing the various tests for determining the functional activity of the internal ear, in suppurative labyrinthitis, Duel¹² states that only two are necessary, namely, the caloric test for the static apparatus and the noise apparatus for the cochlea. All other tests, such as the turning, the galvanic and the fistula tests, are condemned as being indefinite if not absolutely harmful. No information can be obtained from these latter to assist in determining the necessity for surgical interference that cannot be more safely and more satisfactorily obtained from the former. The author condemns the routine use of all tests at our disposal simply to elicit phenomena which we know beforehand will be present. Nothing but harm to the patient may result and hence their use is discouraged.

Auerbach¹³ reports a case of labyrinthine fistula with complete loss of cochlear function and persistence of normal vestibular function. The interesting features are:

1. The practically normal vestibular reaction, showing neither an increased nor a diminished static activity.

2. Complete loss of cochlear function, indicating a widespread invasion of the labyrinth in the past.

3. Question of treatment. This patient was seen by several otologists, who advised a radical mastoid operation. Was this advice justified in the light of the findings?

4. A dry ear with no spontaneous nystagmus, no dizziness, no loss of hearing, seems to call for no operative interference.

5. With a recurrent acute infection of the middle ear causing retention, dizziness, spontaneous nystagmus, and disturbance of equilibrium, a radical mastoid would be in order. In no case should a labyrinth operation be considered, unless intercranial complications were threatened or manifest.

IX.—Injuries.

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Wilson¹ concludes that exposure to high explosives may produce rupture of the drum, and that this rupture tends in most cases to spontaneous closure, but there may also be concussion of the internal ear with nerve deafness and equilibrium disturbances, with or without rupture. The concussion may pass off, leaving an injured nerve mechanism demonstrable by (a) nerve deafness of a varying degree, and (b) a defect of equilibrium. Best results are obtained by leaving the blood clot over the perforation intact, and by keeping the patient in bed at least ten days to allow the effects of the concussion to subside. High explosives may cause a definite injury to the ear and its central connections.

Shuter² discusses the war injuries to the external, middle and internal ear. Of particular importance is his theory of the causation of concussion deafness, which he maintains is due to a disturbance of the middle ear structures, from dynamic waves, rather than a lesion of the internal ear from sound waves.

Fraser³ reviewing the injuries of the middle and internal ear in fractures of the cranial base, states that the direction of

the line of fracture may run parallel to the long axis of the petrous bone or at right angles to the long axis.

(1) Longitudinal fractures as a rule start in the orbit or region of the sella turcica, and pass backwards along the line of the middle ear cleft, breaking the roof of the eustachian tube and tympanic cavity. The fracture may then pass outwards to the external meatus and squamous region; if this is the case the inner ear is not involved, though the ossicles may be dislocated and the drumhead torn. On the other hand, the fracture, after reaching the roof of the tympanic cavity, may pass inwards through the petrous pyramid, and thus resemble in some respects those fractures which run at right angles to the long axis of the petrous bone. The inner ear is, of course, involved in these latter cases. (The author reports a case belonging to this type.)

(2) Genuine transverse fractures of the petrous pyramid run at right angles to the long axis of the pyramid and always injure the labyrinth. As a rule the fracture passes through the external meatus, roof of the tympanic cavity, vestibule and internal auditory meatus, as this is the line of least resistance. The fracture may, however, pass further forward through the cochlea, or further back when the canals are involved.

If the patient survives the injury at the time he is not out of danger, as meningitis may supervene as the result of infection from the middle ear spaces, or of contamination of the blood in the external meatus and tympanic cavity. Such a complication is more likely if the labyrinth is involved in the fracture.

The author adds two detailed case reports with postmortem findings, both gross and microscopical.

Keeler⁴ reports a case of fracture of the tympanic plate of the temporal bone, from a fall on the chin, causing bleeding from the left ear for forty-eight hours, at first profuse, then gradually subsiding. Five weeks after the accident, examination revealed pus in left auditory canal, tympanic membrane lacerated, and an irregular inflamed elevation on the floor of the canal, obstructing half its lumen. There was distressing tinnitus and loss of aerial conduction and Weber laterated to the injured side. Treatment cured the infection and restored

the hearing. The X-ray revealed the fracture of the tympanic plate with upward displacement.

Marriage⁵ discusses (1) injuries of the auricle and external meatus, (2) injuries of the middle ear, (3) injuries of the internal ear, which are divided into (a) direct injury of the labyrinth by a missile, (b) indirect injury of the labyrinth in fracture of skull, (c) concussion deafness, and (4) psychic deafness. Case reports illustrative of these various types are added.

Yearsley⁶ reports an injury from a loud explosion, in which the trouble was due to an acute depression of the tympanic membranes, without any signs of labyrinthine involvement.

Bryant⁷ calls attention to the prevalence of ear injuries in the French army, having found 16 per cent of ear cases, of the total sick in the evacuation hospitals in the Zone des Armees at the Front. From the evacuation hospitals 4½ per cent of ear cases are evacuated to the rear. In the rear of the Zone des Armees, in the Zone des Etapes, ear cases form 6½ per cent of total sick. Of these 7 per cent are evacuated to the rear. The nature of the injuries and complications are divided into three categories:

1. Rupture of tympanic membranes.
2. Complications of ruptured tympani; (a) suppuration of middle ears, acute and chronic; (b) mastoiditis, mastoid abscess and its complications.
3. Commotion of the eighth cranial nerve apparatus (the cochlear branches always suffer, the vestibular branches less frequently): (a) Sudden onset; (b) gradual onset.

In closing, the author draws attention to the fact that with the English speaking Allies the organization of the otolaryngologic service is the weakest, whereas the best possible organization is needed because of the loss of industrial capacity and consequent increase of pension potentiality of these cases.

Fraser and Fraser⁸ contribute an instructive report on war injuries from the point of view of morbid anatomy. Six cases were examined:

- Case 1. Direct injury by shrapnel.
- Case 2. Indirect injury of the ear, due to bullet wound.
- Case 3. Shell deafness.

Case 4. Injury to the ear due to the bursting of a rifle grenade.

Case 5. Shell explosion.

Case 6. Injury by high explosive shell.

The only changes of importance found in the four cases of "explosion" injury of the ear are:

1. Rupture of the drumhead and hemorrhage into the middle ear spaces.

2. Hemorrhage in the fundus of the internal meatus in three of the four cases.

No change in the neuroepithelial structures of the labyrinth could be discerned, the authors thus being led to the belief that many cases of shell or explosion deafness are functional. On the other hand, rupture of the drumhead and hemorrhage into the middle ear spaces must cause a certain loss of hearing; while hemorrhage in the fundus of the internal meatus may give rise to deafness, tinnitus, giddiness and other symptoms of an inner ear lesion. It may be that the "blow" to the ear due to shell explosion, and the associated loud sound, paralyzes the delicate nerve endings of the auditory apparatus, but this has not been demonstrated microscopically.

X.—Instruments.

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3. Hagemann, J. A.: An Improved Aural Curette. *Laryngoscope*, St. Louis, 1917—XXVII—52.
4. Holmgren: Re-education of the Ear by the Kinesiphone. *Hygeia*, 1917—LXXIX—1.
5. Lubman, Max: An Electrical Noise Apparatus. *Laryngoscope*, St. Louis, 1917—XXVII—512.

Baum¹ has devised an artificial ear drum to be used in cases of defective hearing and for the prevention of concussion deafness. The material is a fine grade of oiled silk. In its finished form it is suspended perpendicularly concaved, and retained in this position by four roll-like folds in continuity, with multiple cornucopial or cone-shaped sound accumulators,

in which the outer or distal expanded openings are largest, gradually diminishing their lumen toward their approximal ends with smaller openings into an expanded or ampulla-like cavity in front of the artificial drum. The continuation of the outer folds of the accumulators expands outwardly with another roll-like fold continuous with the perpendicular circular surface diaphragm or artificial drums, approximating the natural drum or membrana tympani. The outer roll-like surfaces of the megaphone appendages afford a cushion-like contact with the canal walls, conforming with and permitting an easy and flexible support to the perpendicular surface diaphragm or artificial drum. The formation of these roll-like appendages is such as to afford ample intervening space for ventilation and drainage, and for sustaining the membrana tympani while the artificial drum holds it in position. Illustrations with description for making this device accompany the article. Twenty case reports are added:

Hurd² has devised a method of medicating eustachian bougies. Celluloid bougies are used, which are coated with silver nitrate, using gum acacia as a base. His method is as follows:

To a saturated solution of gum acacia in a water bath, using a test tube, add silver nitrate solution, using one-tenth per cent strength of silver as desired. The bougie is dipped about one and one-half inches into this solution, and when the bougie has a uniform coating, it is placed to dry. After this a second coating is given.

It is better to use them the second or third day after preparation.

Hagemann³ has devised an aural curette, an aural hook and tympanum perforator.

Holmgren⁴ reports some success in the treatment of deafness, by means of the kinesiphone, but regards this instrument as but a feeble addition to the aurist's armamentarium. The best results are obtained in dry catarrh of the middle ear and in the condition following suppurative otitis media.

The apparatus presented by Lubman⁵ for testing unilateral deafness consists of two magnetos, two coils and a vibrator set in a nickel case with a fiber base, and operated by a small vest pocket battery, easily procurable at any electric supply

store. The instrument does not have an ear piece as Bárány's, but is applied directly over the ear of the patient and thereby excludes any transmission of sound through the bone of the ear.

XI.—Educational Methods for the Deaf.

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2. Yearsley, M.: The Causation and Prevention of Educational Deafness. *J. Laryngol.*, Lond., 1917—XXXII—117 and 145.

Goldstein¹ announces the creation of a new society to advance the educational measures of interest to the deaf along purely oral principles. Its membership is open to anyone interested in the oral education of the deaf.

Yearsley² discusses the causation and prevention of educational deafness, meaning by "educational deafness" that degree of loss of hearing which prevents a child from obtaining the full benefit of ordinary education in an elementary hearing school, and necessitating his being taught in a special deaf school or "hard of hearing" center. The article is very comprehensive in scope. After discussing the various causes of congenital cases (consanguinity, illegitimacy and syphilis) and acquired cases (the infectious diseases, diseases of the nervous system, primary ear disease, middle ear catarrh, and suppuration and injury), the author discusses the prevention of infection of the nasopharynx, its proper treatment when finally present, and lastly the treatment of the ear condition itself.

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XLIII.

ABSCESS OF THE LEFT FRONTAL LOBE FOLLOWING SUPPURATION OF THE FRONTAL SINUS; REPORT OF A CASE AND EXHIBITION OF SPECIMEN.*

BY W. V. MULLIN, M. D.,
COLORADO SPRINGS.

Mr. K., age twenty-three years, first consulted me on November 5, 1917, complaining of pain over right frontal region, said he had taken cold four days previous and this pain was the result. He also volunteered the information that his father had always suffered from the same type of neuralgic headaches as he had.

Examination showed both nasal cavities to be very free, no unusual hypertrophies of the turbinates and a moderately straight septum; mucous membrane congested and swollen, especially over the right middle turbinate; thick yellow pus coming from the nasofrontal duct on the right side, flowing down over the middle turbinate.

The region of the duct and middle turbinate was shrunk with cocaine and suction applied, this giving relief from pain. The patient was seen daily, the pain returning each morning and being relieved after treatment. On the fourth day, November 9th, he complained of some pain over the left frontal region, but not as bad as over the right, and pus was seen flowing down over the left middle turbinate and from the left nasofrontal duct. The same treatment was applied to the left side. Patient was seen daily for thirteen days. At no time was the pain severe enough to compel him to seek relief by taking any analgesics. The pain became less each day, and the discharge decreased in proportion, so that by November 17th, the thirteenth day, the patient was discharged, entirely free from pus and pain, and returned to work.

On December 27th the patient returned, saying he had taken

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another cold a few days previous and that his pain and discharge had returned. Examination then showed pus coming from both frontal sinuses, and the pain was distributed equally over both sides and across the bridge of the nose. He was then seen and treated three times, December 27th, 28th and 31st, and showed prompt response to treatment. The man being a railroad employe, the matter was talked over with the chief surgeon, and it was decided that perhaps a vaccine might be of benefit in raising his resistance against taking cold and future attacks. Accordingly, he was referred to the chief surgeon, who reported that he administered four doses of Schieffelin's influenza vaccine. The dose did not go above 40/100 cubic centimeter, and there was no reaction.

Although he was told to return for observation, I did not again see the patient from December 31, 1917, until January 18, 1918, when he returned saying that the previous night he had suffered intense pain, that it was well across the forehead, but more severe on the left side. On examination no pus was seen. Shrinking the middle turbinates and the nasofrontal ducts on both sides failed to reveal pus. Patient was told to return the next day, which he did, and reported the pain no better and no relief from treatment previous day. Temperature and pulse were normal, complained of light hurting his eyes, pupils were equal, and no pus could be elicited. The patient was again referred to the chief surgeon, with a request that an X-ray be taken. This could not be done that day, owing to the previous engagements of the roentgenologist; but an appointment was made for the following day. However, the boy telephoned the chief surgeon, on the following day, that he did not feel like having his plate taken that day and would like to change his appointment to the day following, and, as he lived out some distance, this was consented to by the chief surgeon. Early on the morning of January 22, 1918, the chief surgeon received a telephone call from the boy's sister, saying the boy had had a very bad night; cried out repeatedly with pain. A near by local surgeon of the railroad was sent to see him, who gave the following account of the case: Complaining of headache, but not as severe as it had been during the night; was dizzy; had vomited once; pupils were equal; no nystagmus; pulse good and strong; temperature, 101; and

tongue very foul. He gave calomel and a capsule containing aspirin, grains four, and salol, grains two, for headache. After the second capsule the patient quieted down and went to sleep; but his breathing soon became stertorous; he became unconscious; and was dead three hours after he was last seen.

Autopsy showed no general involvement of the meninges and no distention of the brain substance. The dura was found adherent to the frontal bone on the posterior surface; also adherent to brain substance over left frontal lobe. On removal of the brain from the cranial cavity yellow pus flowed freely from a perforation in the dura. Corresponding to this perforation a necrotic area was found on the frontal bone about two millimeters in diameter, which led directly into the left frontal sinus. The sinus itself measured about 1.5 c. c. anteroposteriorly, 3 c. c. transversely, and 1.5 c. c. from the top to the floor. Located in the left frontal lobe was a well defined abscess containing from one and a half to two ounces of pus, causing considerable softening and destruction of the brain substance, but not involving any vital areas. The walls of the abscess were everywhere soft and friable, and the necrosis had extended from the surface all the way through the frontal lobe and had perforated into the left lateral ventricle, which was full of pus, but did not show any lesion except the perforation. Examination of the pus showed *staphylococcus aureus*.

Remarks.—My reasons for reporting this case in detail are several. First, it is my opinion that if the patient could have been kept under close observation at the time he was taking his vaccine, and at the cessation of his discharge, and if he had had his X-ray taken when advised, operative procedure might have saved his life. I think he still had a chance of recovery up to the last morning of his life, when the brain abscess ruptured into the lateral ventricle, with resultant coma and death.

That large abscesses do occur in the silent areas of the brain without producing localizing symptoms is too well known to dwell upon.

Krause, in his *Surgery of the Brain*, reports a similar case in a woman, twenty-three years old. The sinus was

operated upon first, and later, when a fistulous tract was found leading from the sinus, an osteoplastic flap was made, and about half a wineglass full of pus evacuated. The patient did well for a time, but soon extension ensued and the patient died. No autopsy was permitted.

Skillern states, in his book, "The Accessory Sinuses of the Nose," that "Complications from the frontal sinus occur much oftener in (a) older individuals, (b) in males, (c) on the left side." He does not give data in support of this statement, however, and one suspects that they may be merely accidents of a limited body of statistics.

Krause's case was on the left side. It will be recalled that in my case when first seen the pain was more severe on the right side and remained so until the last attack. There was no extension of the left sinus over to the right side that might account for this, as the septum was directly in the median line.

Skillern also says that owing to the paucity of material and lack of sufficient American data, his section on chronic complications of the frontal sinus is based largely on Gerber's work done in Berlin in 1909. Gerber states that complications follow chronic frontal sinuitis in about five per cent of the cases, but admits that his percentage is higher than most rhinologists.

Several questions purport themselves in connection with this case:

Did the vaccine have anything to do with the cessation of the discharge?

Was the abscess forming on the left side from the beginning of the infection, or did the discharge cease when the erosion took place in the posterior bony wall of the sinus? In which event one would have to concede a cure in the right sinus.

One further consideration is: Why should this complication occur in a sinus which apparently had free drainage and which did not manifest the usual symptoms of confined pus? This would hardly be expected, even in view of the capacity of *staphylococcus aureus* for destruction of bone and abscess formation.

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XLIV.

BONE TRANSPLANTATION FOR CORRECTION OF
NASAL DEFORMITIES.*

BY W.M. F. CALLFAS, M. D.,

OMAHA.

Up to five years ago comparatively little was written on bone transplantation for the correction of nasal deformities. Since then much has been written and many methods devised. I claim nothing original except some modifications. In this paper I shall speak of three or four methods which have been very successful in correcting marked nasal deformities.

First, as to the preparation of the field of operation: Thorough cleansing of the skin or the nasal mucous membrane with soap, alcohol, iodin, or iodin and alcohol, equal parts, or silver nitrate solution, four per cent. If the intranasal method is selected, the nose is first freed of the vibrissæ, the nasal cavities thoroughly cleansed, and the posterior space packed so as to prevent contamination of the field. In selecting the extranasal route, the eyebrows are treated as the skin, and part of the eyebrows nearest to the glabella shaved. The face is cleansed with soap and water, followed by iodin, or iodin and alcohol, equal parts, or silver nitrate solution, four per cent. Cohen of Baltimore condemns tincture of iodin for cleansing purposes. He claims that in several cases in which he has used tincture of iodin he had infection following. The infection may have followed in his case had he used some other method. I think that is no argument against tincture of iodin. Other writers have used tincture of iodin with no infection. I have used tincture of iodin and alcohol, silver nitrate, solution four per cent, and have had no infection in any of my cases. After the skin preparation the face should be covered with sterile gauze, leaving only the field of operation exposed. The operator and assistant should wear rubber gloves.

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I wish to speak only of those cases in which the nasal bones are destroyed or in which the bridge lacks support, in which the deformity extends from the nasal notch to near the tip of the nose.

In selecting bone for transplantation, Back prefers the anterior margin of the tibia, and the intranasal route. The anterior margin of the tibia is easily reached, and a piece of bone the proper length, from two to two and a half inches, should be removed. This should be done by a surgeon while the operator is preparing the field for inserting the graft. The bone graft should be removed with the periosteum and placed in a warm normal salt solution. This should be trimmed by the operator to suit himself. This gives you a triangular section of bone covered on two sides by periosteum.

In the intranasal route, the nasal mucous membrane having been prepared, the incision is made through the mucous membrane along one side of the septum, at the junction of the upper and lower lateral cartilages, some distance from the tip of the nose, say three-quarters of an inch from the tip of the nose. The tissues are dissected or elevated along the dorsum of the nose and over the nasal spine to the nasal notch under the periosteum, and down to the tip of the nose, making a pocket in the tip. After the graft is trimmed to the proper length and size, usually three-eighths of an inch thick and two inches long, it is introduced into the incision, the upper extremity pushed into contact with the nasal notch, the side of the graft which is devoid of periosteum is placed inferior, the two sides covered by periosteum being subcutaneous, the tip of the nose is pulled down and the end of the bone is slipped into the pocket at the end of the nose. No stitches are required, the mucous membrane entirely covering the graft. The nasal cavities are packed with vaseline gauze or zinc oxid gauze for twenty-four hours.

Hayden of Chicago prefers the extranasal route, and a graft taken from a rib. A thin portion of a rib should be selected, removing about two and a half inches. The edges should be trimmed to make the bone the desired width. If too thick, it can be flattened by crushing the cancellous tissue, which is easily done by tapping gently on the flat surface of the rib with a mallet. Some operators have removed the can-

cellous tissue, and used only the two compact plates, but this has proved not so successful, the graft lacking the proper nourishment, as the cancellous tissue favors the access of blood vessels which nourishes the bone. The bone graft is then taken care of as in the first method described. An incision about an inch long is made transversely over the glabella and the periosteum is elevated. I find it very much easier to elevate by this method. It is quite easy to get under the periosteum and then follow down over the nasal processes of the superior maxilla and out over the malar bones and the maxilla, gradually working your way down and in toward the nose, working from both sides to the dorsum and to the tip of the nose. The graft is then introduced, the lower end extending to the tip of the nose and the upper end resting in the nasal notch. The incision is then partly closed with stitches. There should be left sufficient space for drainage, as there is considerable bleeding, and the swelling and ecchymosis will be less if proper drainage has been provided.

William Wesley Carter of New York City prefers the intra-nasal route, but he selects for his graft a portion of the ninth rib with the cartilage attached. He uses two inches or a little more, two-thirds of this being rib and one-third cartilage. He removes this section with periosteum on the external surface. He splits the graft through the center, using only the external half covered by periosteum. The graft is then trimmed and inserted as in Beck's method. The cartilaginous end is manipulated into the pocket at the tip of the nose. This graft has the advantage over the other two in that there is some flexibility to the end of the nose, which should be quite an improvement. The operation is in all details the same as the one described as preferred by Beck.

These photographs were taken in the latter part of 1914, these being my first two cases of bone transplantation for the correction of nasal deformity. The deformity being very great, there was no support between the nasal spine and the tip of the nose, both of these cases being the result of an injury in early childhood. In both of these cases pieces of the nasal bones had sloughed through the skin, leaving much scar tissue. In both of these cases I selected the extranasal route, as preferred by Hayden, but used the anterior margin of the

tibia covered by periosteum, as preferred by Beck. In both of these cases, as you can see by these photographs, the deformity was extreme, and on account of the scar tissue the elevation was extremely difficult, and had to extend over both malar and maxillary bones to allow the tissues to be raised sufficiently, to introduce the bone graft. The graft was prepared, as described in Beck's method, and the field was prepared as described in Hayden's method. To facilitate the introduction of the graft, I introduced a long speculum, such as is used in submucous resections, and then separated the blades and introduced the graft between the blades. I then withdrew the speculum, leaving the graft, which was easily manipulated into the desired position. The incision was then closed with two stitches, leaving room for drainage. These photographs were taken just preceding the operation, and the second photograph two weeks later.

The objection made by some writers against the extranasal route is that it leaves a scar. In these two cases the scar was insignificant and hardly noticeable. I see no objection to the extranasal route from this point of view.

In the intranasal route, I think you are more liable to have infection, although it is claimed that the nasal secretions have a germicidal effect, but from my observations I have found that those who used the intranasal route have had more infections than those who used the extranasal route.

I also think in marked deformities it is very much easier to elevate by the extranasal route than it is by the intranasal. In the two cases I have described, the scar tissue was so strong and the deformity so great, that I am of the opinion that I could not have elevated the tissues as easily or as well had I started by the intranasal route. By using the extranasal route it was quite easy to follow down over the nasal processes of the superior maxilla, over the malar bones and the maxilla, and then work in toward the dorsum of the nose until I reached the scar tissue, which had to be cut. It was impossible to separate these, so I had to cut through this scar tissue. In both of these cases I was successful in reaching the tip of the nose without puncturing the mucous membrane or skin.

Another important point is the immobilization of the graft after it has been placed in position. Many devices have been

invented. I prefer using very thin strips of absorbent cotton, pasting these over the nose, up over the forehead and down over the cheeks, using collodion for this purpose. You can make many layers and in different directions, so that you not only make a nice shield for the nose without any pressure, but you also fasten the nose so that it immobilizes the parts very well. Along with this you can use Andrew's aluminum splint, which can be used over the collodion cast. The collodion cast in this case would serve a double purpose, as the splint will more readily adhere to the fibers of the cotton than it would to a smooth surface. The splint is made of aluminum and easily conformed to the face and nose. The surface to be molded over the nose is rough and adheres to the cotton. The splint is fastened with cotton and collodion. I also used in the two cases described, a rubber tubing in the nostrils. I used this for a double purpose. In spite of the fact that I elevated over the malar bones and maxilla, the skin was so unyielding that it pulled down on the bone graft. I introduced the rubber tubing for the purpose of helping to support the graft as well as to give the patient considerable comfort in the way of being able to breathe through his nostrils. I used no other packing in the nose.

The change in the appearance of these two men was very gratifying. One man had finished a business course and could not obtain a position on account of his deformity. Two weeks after the operation the photographer who took the first picture did not recognize him, although he was dressed in the same suit and sat in the same position as he did just two weeks previous. I have seen this man several times since and had X-ray plates made. The graft was intact.

XLV.

THE LOTHROP OPERATION FOR FRONTAL SINUITIS, WITH REPORT OF TWO CASES.*

BY JAMES J. PATTEE, M. D.,
PUEBLO.

Recent literature has contained a number of splendid articles upon both the internal and external operations for disease of the frontal sinus. Anatomic study, accurate roentgenography, genius in devising and using improved instruments, and a critical study of the comparative merits, risks and untoward results of the different operations have resulted in marvelous achievements in both extra- and intra-nasal operations.

Although each of these operations has its respective indications, surgeon differ considerably in their choice in a given case, some being quite partial to the intranasal method, while others are as inclined to the extranasal. From a general survey of published opinions, there is, in my judgment, a progressive increase in the number of internal operations with a corresponding lessening of the external. Personally, I am in accord with this order of things.

Gleason¹ thus quotes from Stucky: "Within the past three years I have been especially impressed with how little intranasal surgery is necessary to relieve the most complicated and serious conditions in which the visual apparatus presents the most alarming symptoms, and I am finding fewer cases that require the radical external operation, even for the relief of suppurative pansinuitis." The same author in that article quotes Kuemmel² of Heidelberg as follows: "Unless there is some vital indication, too little is better than too much interference in chronic frontal or ethmoidal sinuitis." Gleason¹ then states: "There are doubtless a few cases of acute fulminating suppuration and some chronic cases where the Killian operation is justifiable or even imperative; but the fact remains that those who have done the fewest Killians or com-

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plete exenterations of the labyrinth by the nasal route have the least to regret in the number of dissatisfied patients. Except where the symptoms are most urgent, it is better to resort to less radical procedures, which in the majority of cases are adequate, and yield infinitely better results." Quoting from Watson-Williams²: "In 1911 I emphasized the complete efficacy of these intranasal methods in a considerable percentage, maintaining that they are more desirable methods of treatment than the external operation, even if not resulting in absolute cure—provided the symptoms are not such as to make more drastic operative treatment really necessary."

Although the recorded expressions upon the comparative merit of the two procedures seem to place a very high rating upon the intranasal method and cause the pendulum to swing away from the radical frontal sinus operation, it is admitted generally that a few cases at least require the external operation.

The external operation should be considered only after intranasal treatment, including the intranasal operation, has proven inefficient or in cases where, on account of anatomic obstacles or pathologic changes, nothing short of a radical operation would seem to guarantee the greatest safety and best result.

Anatomy.—Although writers have contributed much to this subject, I desire to emphasize a few points. The surgical anatomy of the floor of the frontal sinus, the anterior ethmoid cells, the cribriform plate, the middle turbinate and the lacrimal bone, all within exceedingly narrow confines, are worthy of the continued study of every rhinologist. There are, along the nasofrontal canal, severe arbitrary anatomic limitations from which the surgeon dare not vary without danger to the eye or brain. In this space, we may, indeed we must, go thus far and no farther. Removing too little is better than too much. However, unless adequate permanent drainage is established, the operation will be a failure. It is well to remember, as pointed out by Mosher,³ that the inner canthus of the eye is a valuable landmark. We have the following from Watson-Williams: "It is worthy of note that the cribriform plate does not extend forward beyond the tabula interna, and that the anterior border of the middle turbinal body is in

front of the anterior end of the cribriform. The middle turbinate forms the inner boundary of the anterior ethmoidal cells; the lacrimal bone, the outer. The width of the potential passage between the inner and outer boundaries varies with the development of the intervening cells, but in its narrowest part corresponding with the level of the inner canthus, the space measures seven to twelve millimeters in adults. Therefore, the width of an instrument intended to clear the space of obstructive cells should not exceed six millimeters, while in some patients it must be less." An injury to the lacrimal bone would be of less consequence than an injury to the cribriform plate; hence it is safer to keep laterally rather than medially if in doubt.

The adult frontal sinus, with its numerous ramifications, varies greatly in size, shape, and disposition. I shall omit a detailed description of the numerous variations, although I should like to call your attention to one feature of the Lothrop operation with relation to sinus variations, as follows: In case there is a sinus in the orbital or horizontal portion, but none in the vertical or frontal portion, this can be reached by the Lothrop operation. On the other hand, if a sinus is present in the vertical portion but absent in the orbital portion, the Lothrop operation likewise meets the requirements. In brief, a strong point in favor of the operation is its short direct entrance into the sinus at that point in its floor, where all the ramifications and subdivisions converge. Through a small opening just where the frontal, nasal and maxillary bones articulate, the different portions of the sinus are exposed. Besides the possibility of operating for a considerable distance upward and laterally into the frontal portion, one can operate posteriorly and laterally in the orbital portion. Moreover, and what is more worthy of note, the fact remains that the danger zone containing the anterior ethmoidal cells, the lacrimal bone and the anterior end of the cribriform plate can be visualized and operated from the closest and most natural approach—advantages worthy of consideration.

The presence of partitions in a sinus does not hinder the course of healing to any great extent because, as pointed out by Shambaugh,⁴ they are partial and usually extend downward from the upper margin. "These partition plates are placed

so as to interfere very little, if any, with drainage through the natural opening of the sinus, but their presence may interfere materially with the thorough exenteration of pathologic conditions within the sinus, even when performing the external operation. J. Parsons Schaeffer⁵ has observed as many even as four frontal sinuses on one side, each with an independent communication with the *cavum nasi*."

The illustrations presented are copied from the works of Lothrop and Loeb.

Pathology.—The mucous membrane in chronic frontal sinusitis is thickened with connective tissue proliferation. There is edema and pus production, with consequent polypoid formation and sometimes necrosis of bone, although, except in syphilis, this is very rare. The conservative method of treatment is efficient in the great majority of these conditions except in caries, which is extremely infrequent.

Custom differs regarding curetting of the sinuses. Some operators systematically curette every sinus as thoroughly as if necrosis or malignancy existed. I believe such procedures should be limited to hypertrophy, polypi, and exuberant granulations. In the majority of cases the mucous membrane does not reach such an advanced degree of degeneration. Moderate changes return to normal if merely drained and ventilated. On the other hand, too much curetting retards recovery and impairs results. If my opinion that the amount of curetting should be tempered by the degree of pathologic alteration is sound, then the Lothrop operation is much to be preferred to the Killian for all but the rarest of cases.

Radiography.—The skiagram is an invaluable method of obtaining knowledge along many lines. By its use we may detect variations in the size, shape and type of the sinus. By its use, too, we may determine the septal subdivisions and pathologic changes which should be regarded in choosing the method of operation. If the frontal portion of the sinus has a deep space between the outer and inner plates, a Killian operation will leave great cosmetic deformity.

Choice of Operation.—The operation of choice should be one that permits of thorough work; establishes adequate drainage through the floor of the frontal sinus; affords the best vision, the least distance and the most direct route to the site

of greatest difficulty and danger; one that permits healing in the shortest time and minimizes untoward after-effects.

The extranasal operation should not be chosen unless the surgeon is convinced it possesses advantages which guarantee better results than other methods.

The Operation.—In describing the operation, I cannot do better than quote Dr. H. A. Lothrop,⁶ the author, in his own language. "Preliminary intranasal treatment, including removal of the anterior end of the middle turbinate and breaking up some of the neighboring ethmoidal cells, is advisable because this may effect a cure. The patient should be etherized. The eyebrow should not be shaved. A single curved one-inch incision is made in the inner portion of the eyebrow, limited externally by the supraorbital notch. The bone is bared of periosteum over the area indicated in Figure 1. The sinus is entered with the chisel and enlarged by the rongeur forceps so as to make an oval opening about three-fourths of an inch long. The region is then explored with the probe, and pus, granulations and polypi are gently removed, if present, after which this curved probe is to be passed through the ostium into the nose and left in situ as a guide. Small curved curettes are then passed down from above, just in front of the probe, and the walls of the cells on the floor of the sinus are broken up. On account of the proximity of the anterior end of the cribriform plate to the ostium frontale, the posterior angle of the sinus should be constantly avoided. The operation is to be completed by means of burr drills. The rasps should be used first and may be passed from above and below through the enlarged ostium, cutting forward and laterally. The burrs and rasps are to be used alternately at the discretion of the operator, gradually reaming out all the dense bone of the floor of the sinus toward the base of the nose. This bone includes the nasal crest and spine of the frontal bone, the thick ends of the nasal bones, and the nasal process of the superior maxilla. The interfrontal septum should be perforated and then burred away so that the other sinus may be explored. Then the perpendicular plate of the ethmoid should be removed, as shown in Figures 3 and 8. Through this same opening in the anterior sinus wall and also through both sides of the nose, both of which are now accessible, the

dense bone under the opposite sinus is burred or rasped away until, finally, there remains only a thin shell of bone around the whole circumference of the floor of the sinus in front, as shown in Figures 3 and 8. In all instances, even when only one sinus is affected, experience has shown the wisdom of using the combined floor of both sides. Finally, determine that sufficient bone has been removed from the perpendicular plate and that the cells opposite the lacrimal bone, the agger nasi cells, and other neighboring ethmoidal cells have been broken up. The skin incision is closed."

Case 1.—S. F., age thirty-seven years, an Italian coal miner, consulted me November 13, 1916, having been referred by his physician, Dr. Herbert A. Black. Previous health, good. He stated that ten days previous to the consultation he was hit in the right eye with a piece of coal. No evidence of any injury could be found. On examination I found an olive-sized swelling just above the right eyeball and a little to the left of center, causing some fullness. On examining the nasal cavity, the anterior end of the middle turbinate appeared large and soft, and the mucous membrane was grayish in appearance. There was considerable grayish, rather thin discharge.

X-ray report by Dr. Crum Epler was as follows: "Right frontal sinus medium sized and diseased throughout; left seems to be normal. Right maxillary sinus is hazy and believed to be infiltrated and diseased. Ethmoidal cells diseased; the sphenoids seem to be normal."

The Lothrop operation was decided upon. Exposing the sinus, I found an unusual amount of soft, semisolid material, very vascular and appearing to pack the cavity more than polypi or pyogenic tissue usually does. A tumor was suspected, although, up to this time, I had assumed that I was dealing with an ordinary polypoid change. A free opening was made into the nose, the areas cleaned as much as possible, and some necrosed bone removed in the upper central lacrimal region. A moderate amount of similar material was removed from the maxillary sinus. The wound was closed without packing and healed by primary intention in two weeks; the external swelling disappeared.

The pathologist's report by Dr. Maynard was as follows: "Gross—Soft, irregular shaped masses; gray or grayish pink.

Microscopic—Growth shows loosely connected round cells, size varying; stroma fibrinous; very vascular with many hemorrhagic areas; many mitotic figures and occasional giant cell. Diagnosis—Sarcoma of nasal mucosa."

After about three weeks, the nose began to rapidly refill with the growth. Orbital swelling developed after five weeks. Vision, which was normal up to this time, began to diminish; diplopia due to exophthalmus appeared, and total blindness developed about six weeks after operation. The patient died February 27, 1917. See photograph, page —.

It seems to me the Lothrop operation offered, even in this case, all that operative intervention could accomplish, and that for any nonmalignant condition, at least, it permits of maximum eradication of diseased tissue with minimum surgical interference.

Case 2.—December 20, 1915, G. P., an auto mechanic, consulted me in regard to pain over the left frontal sinus. Age twenty-two years, American, married. General health, splendid. He gave a history of pain and tenderness over left eye and in left maxillary sinus on three occasions since 1907. In that year, 1907, he suffered great pain and tenderness over left eye. He was confined to bed for two weeks with fever, loss of appetite, sleep, and strength, in spite of a specialist's service. After failing to be relieved by tentative treatments he had an operation upon his nose and maxillary sinus. Following this, he received treatments including irrigations of the maxillary sinus. In 1909 he was operated upon again by another rhinologist who also opened the antrum. In 1912 the third operation was performed and seemed to be, so far as he could tell, the same identical operation as the two preceding. On December 27, 1915, he consulted me. He was again suffering intense pain over left eye; there was increased lachrimation, and considerable swelling and edema of the upper lid. Intranasal examination revealed absence of a portion of the anterior end of the middle turbinate, together with portions of the anterior ethmoid cells. There were bands of scar tissue and an occlusion of the infundibular space. Considering the cicatricial nature of the field, there was considerable redness, although adrenalin and cocaine failed to shrink the parts to any extent. The pain increased, and the swelling gradually closed

the lids. After five days of fruitless intranasal treatment I advised his physician to have a Lothrop operation, inasmuch as three days previous intranasal operations had failed.

On exposing the mucous membrane of the sinus, it was found to be slightly thickened, fairly smooth and of a dull grayish red color. On opening the mucous membrane a retention abscess was found to fill the sinus. There were no polypi and no granulations. The opposite sinus was opened and found normal. A large part of the septum of the frontal was removed and the floor upon both sides was opened widely into the nose. Recovery was prompt. No disfigurement. I recently examined the patient and found no difficulty in getting into the sinus.

SUMMARY.

1. More intranasal and fewer extranasal operations are being performed.
2. The external operation should not be chosen until the internal has been found inefficient.
3. It is strange that the most essential, the most difficult and the most dangerous work is confined to the narrowest part of the nose. It is well to remember that this is on a plane with the inner canthus.
4. The Lothrop operation offers the closest and most direct exposure of this zone, hence the best visualization.
5. The amount of curetting should be tempered by the degree of pathology.
6. The operation of choice should be one that permits thorough work, guarantees drainage, permits healing in the shortest time and minimizes untoward after-effects.

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THE NOSE AND THROAT IN MEDICAL HISTORY.*

BY D. A. VANDERHOOF, M. D.,

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In speaking of the nose and throat in medical history, I am going to present very little except that which can be found in a book written some time ago by Jonathan Wright, and while it is impossible to deal thoroughly with this subject in the few moments which I have, I am going to endeavor to give you some idea of our specialty in the early days of the human race.

The first reference that we have in regard to specialists is made by Herodotus. The passage reads as follows, in Rawlinson's translation: "Medicine is practiced among them (the Egyptians) on a plan of separation; each physician practices a single disease and no more; thus the country swarms with medical practitioners, some undertaking to cure diseases of the eye, others of the ears, others again of the teeth, others of the intestines, and some those which are not local."

There are a number of modern treatises upon the medical knowledge of the "Talmud." There are several references¹ to acute inflammations of the throat, which seem to refer to the existence among the Babylonian Jews of diphtheria, or of that disease described later by Aretaeus as lyriac ulcer, from which "they died the most terrible death of all the nine hundred and three deaths possible."

We are still further reminded at this time of Chaldean medicine, by the incarnations spoken of as therapeutic measures, of demons as etiologic factors in fatal throat inflammations, and of the dung of a white dog mixed with myrrh as a local throat application in cases of coryza.

At times familiar surgical operations are recognized as follows: "By means of forceps between thumb and fingers, drawing the uvula forward, the physician may cut it with a

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sickle-shaped knife above the top of the tongue (uvulotomy)."

"Gilagum (quinsy), so called, may be cured by the knife. A firm, hard swelling filling the fauces, with sprouting flesh, giving rise to much pain, caused by the evil inflammation of the humors, killing almost a hundred men, is recognized as incurable; but a tumor seen in the throat about the size of the seed of the *Phyllanthus Emblica*, stationary, a little painful, made up of phlegm and blood, adherent like the fruit of the *Terminalia Alata*, this, curable by the knife, is called Gilagu."

Jonathan Wright says we are here to recognize a differentiation of malignant and benign swelling of the tonsils.

In regard to rhinoplasty: It is especially in the Hindu writings that we find complete and minute accounts of the various plastic operations about the nose. This was due, doubtless, to the practice of the wrathful Oriental potentates who amputated the nose out of revenge or in the exercise of judicial penalties.

Vaporization and fumigation through a tube were frequently employed in the diseases of the nose and throat. Stimulating and acrid vapors seem to have been recommended in what we call ozena.² It was also prescribed for coughs, asthma, hoarseness, mucus discharges and enlargement of the tonsils, but it was also advised in baldness and a reddish yellowness of the hair.³

Local applications of ointments were made to the nostrils and various sternutatories were used for cleansing the nasal chambers, after which, apparently in coryza, the following directions were explicit: The patient was to lie on his back, raise the tip of his nose with his index finger and allow his physician to drop in his nostrils warm oleaginous liquids. While this was being done he was not to become angry, nor speak, nor laugh, nor swallow the oil dripping from his nose, but spit it out. The use of the sternutatories, or snuffs, was also recommended for sleeplessness and clearing the head in the morning. Our douches and sprays undoubtedly correspond to the above treatment as used in the early days of the Hindus.

If a foreign body is in the throat, the extraneous matter may be discharged by thrusting down a hot iron, to dissolve or soften it, and so remove it. In such cases the hot iron is passed through a metallic tube.

The period of four or five hundred years which stretches from the supposed age of Homer to the birth of Hippocrates

(460 B. C.), is one of which we know but little in the history of medicine. There was medical knowledge in Greece before the birth of Hippocrates, but the records of it have perished and so have the works of those who followed him. He was the first to discover the probe, according to Greek legends, the first to bandage a wound, the first to teach men to draw teeth and purge the bowels.

Alcmaeon says that a moist warmth in the tongue, joined with the softness of it, gives differences of taste. Diogenes, who was born in the fifth century B. C.,⁴ says that by the softness and sponginess of the tongue, and because the veins of the body are joined in it, tastes are diffused by the tongue; for they are attracted from it to that sense and to the commanding part of the soul, as from a sponge.

Alcmaeon is said to have been the first Greek anatomist and to have dissected the eyes and ears of animals, discovering the optic nerve and the eustachian canal, thus antedating in the latter discovery Eustachius by many centuries.

When we realize that the ancients, Hippocrates, Galen, and their followers, knew nothing of the muciparous, and of course nothing of the function of these microscopic structures, it is easy to understand the absolute mental necessity for them to find some explanation if the liquid were swallowed. This lack of knowledge, as well as a mistaken anatomic observation, led them into another error which persisted still longer. The cribriform plate of the ethmoid bone at the top of the respiratory tract was usually seen only in the dried specimen by the ancients unfamiliar with dissection of the human body. The idea arose that the humors were distilled in the gland like contents of the cerebral cavities and sifted through the plate of the ethmoid to the parts below.

Herodotus says that the Libyans,⁵ when their children came to the age of four years, burned the veins at the top of their heads. Others burned the veins about the temples. This they did to prevent them from being plagued in their after lives by a flow of rheum from the head, and such they declare is the reason they are so much more healthy than other men. This burning was the sovereign Arabian cure for all diseases. During this Greek period the nature of the tonsils is also explained as round bodies placed in each side of the throat to

absorb the secretions from the head and send them back there again and to do likewise for the vapors. From acute and chronic inflammations they may become greatly swollen. For enlarged tonsils he advises evulsion with the fingers.

In regard to nasal polypi, there is nothing in the Hippocratic books so familiar to the modern rhinologist as Hippocrates' sponge method of removing nasal polypi. It consisted of tying the ends of three or four strings to a sponge cut to the proper size and shape. The other ends knotted together were fastened to the eye of a soft slender tin or leaden probe, which was pushed through the nose into the pharynx. The ends of the string thus secured were passed over the end of a forked probe held in the pharynx. By traction across this, the sponge was dragged into the pharynx, if successful bringing the polypi with it. In another method for harder growths, the principle of the snare was employed. The loop of a sinew was adjusted around the polypi, and the end having been carried to the pharynx and traction made as before, evulsion was attained. For bone-like growths he employed cauterization with a hot iron through a hollow tube used as a speculum. After all these radical operations he advised the application of copperas powder and the insertion of tents in the nostrils, smeared with oil and honey, undoubtedly to prevent synechia and stenosis.

It is about the time of Celsus and during the reign of Hadrian (117-138 A.D.) that we first read of the technic for tracheotomy. In cases of cyanosis we entirely disapprove of this operation, because the incision is wholly unavailing when all the arteries and the lungs are affected, but in inflammation about the mouth and palate and in cases of indurated tonsils, which obstruct the mouth of the windpipe, and the trachea is unaffected, it will be proper to have recourse to pharyngotomy in order to avoid the risk of suffocation. When, therefore, we engage in the operation we slit open a part of the arteria aspera below the top of the windpipe, about the third or fourth ring, for this is a convenient situation, as being free of flesh, and because the vessels are placed at a distance from the part which is divided. Therefore, bending the patient's head backwards, so as to bring the windpipe better into view, we are to make transverse incision between two of the rings, so that

it may not be the cartilage which is divided, and then removing the vessels aside, if they come in the way, make the incision.

Among the Greek writings of the Eastern Empire we find that Janus Damascenus recommends that in removing foreign bodies from the throat a piece of half cooked meat on a string be swallowed, then a quick traction on the string be made, which will immediately bring up the foreign body.

Tonsillectomy at this age is spoken of as follows: "When glands occur in the throat similar to the glands which occur externally, they are called the two tonsils. When thou hast treated them with those things which I have mentioned and they are not cured, look and if the tumor is hard and of a dark color, of slight sensibility, do not touch them with the knife. And if it is of a red color and the base is broad, do not touch it with a knife for fear of hemorrhage, but delay until it has ripened, for then thou canst perforate it or it will break of itself, but if it is of white color, round and has a slender base, this is the kind which is suitable and thou shouldst cut it. Thou shouldst examine before operation if the swelling has entirely disappeared, or in what manner it has diminished. Then thou seatest the patient in the clear sunlight and takest his head in thy lap and openeth his mouth and taketh the instrument in thy hands which will depress his tongue, a concave instrument, thou canst make it of silver or brass; it should be thin like a knife; with this the tongue is depressed and the swelling will then be apparent to thee, and let thy vision fall upon it. Then thou shalt take a hook and fix it in one tonsil, and with it thou shalt draw it out as far as possible; but of course thou shalt not draw out with it any of the membranes. Then thou shalt incise it with an instrument similar to a forcep, except that the ends are curved and the edge of each is opposite the other and is very sharp. It is made from Indian or fine Damascus iron. But if this instrument is not at hand thou mayst cut it with a knife sharp on one side; less so on the other."

Berenger, who taught surgery at Bolonga from 1502 to 1527, was the first to describe the sphenoid sinus, which he considered the source of catarrh; and it was also he who is credited with being the first to definitely indicate the accessory

nasal sinuses, although Galen refers in several places to the porosity of the bones of the head, making them of little weight, but there is no direct reference to the sinuses. It was Ingrassias in Sicily, in 1563, who was the first to describe the anterior ethmoid cells and likened the structure of the bone to pumice stone. Colombo and Ingrassias both described the inferior turbinated bones, but Casserius in 1610 described them all and gave them their present name.

One can easily recognize the similarity of the operations performed in the early days with those of today, and if we had time we could follow their improvements step by step. Instruments have been improved upon, technic has been simplified, but nevertheless the similarity is there.

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XLVII.

RELATION OF BLOOD PRESSURE TO PATHOLOGIC CONDITIONS OF HEAD AND NECK.*

By T. E. CARMODY, M. D., D. D. S.,

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While the study of blood pressure variations in pathologic conditions of the heart and circulatory system has been used by the internist routinely for some years, it is only recently that those doing special lines of medical practice have resorted to its use as an aid in their work.

Our attention was called to its value in the first place in connection with vesicular lesions, and further use has convinced us that it should be used as a routine measure in every case. The reasons for this would seem at first to be few, and it would be found less frequently necessary in well-regulated hospitals where our patients had been subjected to thorough examinations before coming to our hands. This, however, unfortunately, cannot be, or is not the case with more than a small percentage of our cases, and it behooves us to protect ourselves by making such tests as may also protect our patients.

I have found very little in the literature devoted to blood pressure which even mentions diseases of the nose, throat or ears, except in a general way.

It may not be out of place to give concisely the method usually employed in taking the blood pressure, although we have for the last three years employed the coagulation test, and taken the blood pressure in surgical cases before operation, we have developed nothing particularly new in the technic. The following is the method usually employed and the precautions to be observed, according to Faught:

Suggestions to Be Followed and Precautions to Be Observed While Using the Sphygmomanometer.—Position of the pa-

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tient: Whether the observation is made in the reclining or sitting posture will be determined by the nature of the case and by exigencies of practice. In the critically ill, the horizontal posture is preferable, although it will not always be found convenient or possible in the presence of orthopnea, while in ambulatory cases it will not always be found convenient to employ the horizontal. One point to be borne in mind is that for purposes of comparison it is essential, whenever possible, to make all subsequent observations in a case in the same posture as was at first. At all events, the location of the arm band, irrespective of the patient's posture, should be at the heart level, thus eliminating the error due to gravity. Under all circumstances the patient should be in a comfortable position and one favoring muscular relaxation.

Application of Cuff.—The cuff is usually applied to the arm above the elbow and should be maintained at the heart level. It should be applied directly to the bare arm or over very thin coverings, and wrapped firmly. This will avoid the unnecessary delay required to fully inflate a loosely applied arm band. The arm band should not exert pressure. This point is also of importance in using any method other than the auscultatory, since the grade of the volume of confined air, the less marked will be the rhythmic impulse transmitted to the manometer.

Time of Observation.—Whenever possible, observation should be made at about the same time of day and in the same relation to the taking of food. Observations should not be made during periods of excitement or after exercise or in periods of profound fatigue, neither after the injection of large amounts of fluid or of stimulants, as tea, coffee or alcohol. An overheated or unduly chilled extremity will affect the arterial pressure in the part. Observations made under pathologic conditions such as edema or spasms are absolutely unreliable.

Fear and psychic disturbances markedly influence the readings; for this reason, in the nervous and excitable, the initial reading is often higher than those made subsequently.

Condition of Indicator and Cuff.—A leaky apparatus will give unreliable readings; old rubber parts are often responsible for this. When properly connected the apparatus should

be able to sustain the mercury column without receding. A rapid fall indicates a leak somewhere in the air system and should be corrected. At the beginning of each test the indicator, irrespective of type, should register zero, and in the mercury instruments the mercury column should not be broken. This latter condition may be overcome by abruptly jarring the apparatus until the mercury unites.

The Performance of the Test.—The greatest rapidity compatible with accuracy is essential, since undue delay while the arm is under compression will, through vasomotor influences, give a disagreeable sensation and may also affect the systolic pressure. Two or more readings should be made, whenever possible, for purposes of verification, to eliminate psychic and other transitory sources of variation, and no single observation should be accepted when it is possible to make additional ones.

The Keeping of Records.—Whenever possible blood pressure records should be preserved. This not only makes for accuracy in individual readings, but also furnishes valuable data for comparison, not only in the same case, but also in statistical studies. For this purpose a card is employed upon which individual daily records are made and filed, and from which, when desired, graphic charts are easily compiled.

The Scope of the Test.—The clinical determination of blood pressure involves an estimation of the systolic and diastolic pressures, from which may be determined the pulse pressure and the mean pressure. The value of the observation is enhanced if the pulse rate is recorded as a part of this examination.

Any peculiarities noted either while palpating the pulse or in variations from normal in the series of sounds heard during auscultation of the vessels should be recorded. Valuable supplementary information may be developed through a careful consideration of these factors.

While the palpatory method has been used in most of the cases reported by us, we use the auscultatory in many, and while the latter is acknowledged to be the most accurate, we feel that the former has given us much valuable information

in many cases. The other methods not being used frequently, except the graphic, which is essentially a laboratory aid and method for experimental cases and requiring much apparatus, and will only be mentioned.

The Visual and Oscillatory.—Mention has been made by a number of authors in using the auscultatory method of the use of a small bell to the stethoscope. This was found to be especially necessary in a number of very small children examined for me by Dr. Fleming in the Children's Hospital. (Instruments used were Faught and Tycos.)

The reason we do not have more accidents due to high pressure in our operative cases is probably because of the fact that before all operations the patient is purged, and according to the observations of Neilson and Hyland, especially in the study of the effect of magnesium and sodium sulphate, sodium tartrate, and compound jalap powder in the usual therapeutic doses.

The systolic pressure was tested in one hundred and twenty-six patients, of whom one hundred and nine showed a lowering of the systolic pressure varying from five to thirty-five per cent. Twelve showed practically the same blood pressure throughout the experiment. Five showed an increase during the experiment. Twenty-four hours after the cathartic was given, forty-eight had a systolic from five to eighteen per cent lower than before the cathartic was given. Twenty-six had practically the same as at the beginning. Only those who remained in bed were tested twenty-four hours afterward. The action of the different cathartics was practically the same, except that the compound jalap produced a more constant and greater lowering than the others. They also showed in most instances quite a decided lowering at the end of twenty-four hours. It was found in this set of experiments that those individuals with a systolic pressure of 140 and above, the highest test being 190, gave an average lowering of 23 millimeters Hg. Fifty-seven individuals, with a pressure from 110 to 140, gave an average lowering of 13 millimeters Hg., while thirty-four individuals, with pressure of 110 or lower, gave an average lowering of 7 millimeters Hg.

A study of systolic, diastolic and pulse pressures and the rate of heart beat was made on sixty-eight individuals.

Percentage lowering of the systolic pressure in this number, taken as a whole, was seventeen per cent.

The diastolic pressure was lowered eight per cent. The pulse pressure was decreased twenty-four per cent.

The number of heart beats as a whole were decreased fourteen per cent. Fifty-six patients showed a decrease, nine showed an increase, and five showed no change.

If we examine these results, we find that an average lowering for all cases is 18 millimeters Hg. The average lowering for those who had initial pressures ranging from 140 to 190 was 23 millimeters Hg.

Those individuals who had a low initial pressure lowered only 7 millimeters Hg.

For instance, one fell from 180 to 100; another from 170 to 120; another from 190 to 115; another from 120 to 80; another from 108 to 78, etc. It is in these extreme results that we most frequently find the developments of an arrhythmia or the increase of an arrhythmia already present.

The result of this set of experiments, supported by the clinical facts that patients with diseased hearts may become worse on brisk catharsis, warrants the assumption that all cases, in which severe purging is used for depletion of the blood, ought to be controlled by watching carefully the blood pressure, heart beats, and regularity, and the general condition of the patient.

The control of bleeding as well as the lack of pathologic heart symptoms due to high pressure, may in many cases be due to withholding water before operation and the subsequent laxity of blood vessels on account of lessened fluid.

Hemorrhages from the nose and throat should not be a cause of alarm unless the pressure drops suddenly, and in many cases should be cause for rejoicing.

Briggs reports a case of intracranial hemorrhage, with a blood pressure of 400 millimeters Hg. While we cannot report a case with this pressure, one of the first cases to impress the value of the estimation of blood pressure, in our work, was a nasal hemorrhage.

Patient, woman, sixty-five years old, had been suffering from nasal hemorrhage for about an hour and fifteen to thirty minutes, when the author arrived. As pulse seemed full,

pressure was taken and found to be 296 millimeters Hg. systolic. Judging from this that she had simply, by good fortune, escaped intracranial hemorrhage, she was allowed to bleed, the pressure being taken frequently for about one and one-half hours, when hemorrhage ceased, with blood pressure at 190 millimeters Hg. There has not been a recurrence, and patient is in apparent good health. Three and one-half years have elapsed since this experience, and it has been our practice since to take the blood pressure in every case of nasal hemorrhage before attempting any method of control by local means.

A case seen recently with a history of considerable bleeding for three days (a young man of twenty-two years), and on examination bleeding had ceased, although a large clot was removed from the left nostril. Blood pressure was 128 millimeters Hg. systolic. Thirty-six hours later the pressure was 155 millimeters Hg. Twenty-four hours later, 138 millimeters Hg.

Our ear examinations are not complete today without recording the blood pressure, as we may find in otitis media chronica cases, especially those with tinnitus, a lower blood pressure with less frequently a high, and in a very small percentage, normal.

Our observations in children have been very interesting, and in many cases, especially those referred for tonsillectomy, we have been able to suggest a possibility of pathology in remote organs to the internist. The tables may be of interest:

Age	Coagulation	Hemoglobin	B. Pres.
5 yrs.	2m.	90%	76
11	1m. 40s.	75%	88
20	2m. 10s.	75%	118
23	1m. 15s.	80%	112
10	1m. 10s.	75%	96
8	2m.	75%	80
24	55s.	75%	108
32	1m. 5s.	75%	118
19	1m. 50s.	75%	120
23	45s.	85%	118
45	1m. 35s.	85%	113
3	2m. 15s.	75%	52

Age	Coagulation	Hemoglobin	B. Pres.
2	1m. 30s.	75%	.....
23	1m. 5s.	85%	116
13	1m. 25s.	85%	102
23	1m. 10s.	85%	115
5	1m. 55s.	65%	59
8	2m. 15s.	75%	79
23	1m. 20s.	75%	104
15	1m. 35s.	85%	108
35	1m. 10s.	75%	120
7	1m. 45s.	65%	82
3	2m. 5s.	80%	54
12	2m. 45s.	85%	74
6	1m. 45s.	65%	64
36	1m. 38s.	75%	117
24	1m. 45s.	75%	110
12	2m. 5s.	65%	96
10	1m. 10s.	80%	78
17	35s.	80%	110
10	2m. 15s.	80%	92
40	1m. 30s.	80%	115
26	2m.	80%	110
7	1m. 40s.	80%	82
31	1m. 28s.	75%	90
14	1m.	70%	92
10	1m. 50s.	60%	92
12	1m. 15s.	65%	90
4	2m.	70%	60
11	2m. 30s.	65%	80
26	1m. 20s.	75%	118
33	1m. 30s.	75%	106
20	1m. 15s.	75%	116
20	1m. 58s.	75%	115
32	30s.	75%	120
24	1m. 20s.	80%	110
21	50s.	75%	104
12	2m. 10s.	80%	92
25	1m. 45s.	65%	102
13	1m. 37s.	80%	112
29	1m. 15s.	65%	103

Age	Coagulation	Hemoglobin	B. Pres.
28	45s.	80%	125
6	2m. 5s.	80%	91
28	2m. 40s.	80%	110
17	1m. 30s.	85%	108
3	2m. 10s.	65%	64
44	30s.	85%	130
33	1m. 20s.	75%	108
8	1m. 30s.	85%	85
13	1m. 35s.	70%	100
20	1m. 15s.	85%	112
21	1m. 5s.	85%	105
22	2m. 25s.	90%	120
9	1m. 5s.	60%	78
45	1m. 5s.	75%	134
13	1m. 15s.	65%	90
35	50s.	85%	120
4	1m. 35s.	75%	84
15	25s.	80%	102
6	55s.	85%	98
31	55s.	85%	122
22	1m. 5s.	85%	110
19	1m. 50s.	85%	116
50	50s.	75%	118
7	2m. 45s.	75%	106
6	1m.	80%	98
8	1m. 30s.	80%	65
7	55s.	90%	70
5	1m. 10s.	80%	65
26	2m. 15s.	75%	120
18	2m.	75%	118
16	30s.	85%	118
20	25s.	85%	98
26	40s.	75%	110
16	3m.	75%	84
12	1m. 40s.	85%	94
33	1m. 40s.	85%	114
22	1m. 40s.	75%	112
4	1m. 45s.	70%	64
5	1m. 40s.	75%	60

Age	Coagulation	Hemoglobin	B. Pres.
7	3m. 10s.	70%	70
2	2m. 45s.	70%	.....
7	1m. 20s.	55%	70
7	2m. 20s.	85%	72
7 yrs.		Sys.	Dias.
12	.....	90	40
18	.....	120	75
8	.....	130	60
8	.....	105	85
13	.....	110	60
11	.....	130	50
10	.....	105	60
5	.....	130	70
		80	50

Average age, $17\frac{1}{2}$ years. Average coag., 2m. 1s. Average H. G., $76\frac{3}{4}\%$. Average B. P., 95.

ABSTRACTS FROM CURRENT LITERATURE.

I.—EAR.

The Morbid Anatomy of War Injuries of the Ear.

FRASER, I. S., AND FRASER, JOHN.

Pro. Roy. Soc. Med., Lond., 1917—Sec. Otol., X—56.

The writers classify injuries of the ear according to morbid anatomy as follows:

(1) Direct injuries due to bullets or piece of shrapnel of high explosive shell. (2) Indirect injury due to blows or falls on the head. These injuries may be subdivided into (a) those without fracture of the labyrinth capsule, and (b) those with fracture of the labyrinth capsule. (3) Noise deafness due to prolonged or intense gun fire, and (4) "shell" or "explosion" deafness (labyrinth concussion).

(1) Direct Injuries.—Fracture of the mastoid process or of the external meatus may occur with or without splintering of the bone. The tympanum and labyrinth may also be involved in these cases. Further, the middle and inner ear may be injured by bullets entering through the facial bones and emerging through the mastoid or remaining embedded in the temporal bone. If the patient lives, the nature of the injury can best be ascertained by means of good radiograms—both lateral and anteroposterior. In severe and fatal cases of comminuted fracture of the petrous bone microscopic examination of the ear would be a matter of extreme difficulty, but where the injury is less severe this method may be of use. In many of these cases of direct injury suppurative otitis media occurs as a result of infection, either carried in by the foreign body at the time of the injury or due to secondary infection through the eustachian tube or external meatus.

(2) Indirect injuries of the ear due to fractures at the base of the skull in civil life has already been presented by J. S. Fraser.

(3) Noise deafness is due to physiologic overstimulation of the auditory apparatus. Recent researches have shown that

(a) air conduction of sound is of paramount importance in the production of noise deafness. Conduction through the tissues of the body, including the cranial bones, is of little account. (b) The neuroepithelium (hair cells) of Corti's organ are first affected, later the supporting cells are involved. The ganglion cells and nerve fibers are secondarily affected. The condition is one of so-called "degenerative neuritis." (b) The part of Corti's organ affected depends on the pitch of the sound. If the noise be of high pitch the neuroepithelium at the base of the cochlea is involved. If the noise be of medium pitch, Corti's organ in the middle of the coil is affected; while if the noise be of low pitch, degeneration is found in a portion of Corti's organ nearer the apex of the cochlea. These experiments confirm Helmholtz's theory of the peripheral analysis of sound.

It is very difficult or impossible to draw a line between cases of "noise" deafness and those of "shell" or "explosion" deafness, as both conditions are probably due to excessive movements of the atmosphere conveyed to the labyrinth. The explosion of a shell not only causes a great mass movement of air but produces a loud noise. It is stated, however, that the "blow" produced by the condensation of air following the explosion, reaches the ear before the noise vibration, and that it may drive the stapes inward and fix it in the oval window so as to lessen the bad effect of the loud noise which follows.

In somewhat the same way the stapes is fixed in Gelle's experiment.

(4) "Shell" or "Explosion" Deafness (Labyrinth Concussion).—According to Lermoyez, "shell" deafness is the true war deafness. Various theories have been put forward as to the pathology of this condition. (a) In many cases we are actually able to observe a rupture of the tympanic membrane, accompanied by a certain amount of hemorrhage. It has been stated that in cases of shell explosion in which the drumhead ruptures, there is less likelihood of damage to the delicate structures of the membranous labyrinth than in cases in which the tympanic membrane does not give way. In the same way the internal mechanism of a watch, which has been dropped on the ground, is more likely to escape injury if the

fall results in the fracture of the watch glass. Mere rupture of the drumhead, however, unless accompanied by some lesion in the labyrinth, auditory nerve or brain, would produce only a slight diminution of hearing. We know, however, that patients suffering from severe shell deafness exhibit marked or total loss of hearing. Some further lesion in the auditory apparatus must therefore be sought for.

(b) It has been stated that hemorrhages occur in the peri- or endolymph spaces of the inner ear and that the delicate neuroepithelial sacs and tubes of the membranous labyrinth are ruptured by the violent concussion caused by the explosion. It is supposed that in this way a gross mechanical effect is produced in the inner ear. It would appear, however, that the structures of the membranous labyrinth are well protected from concussion because they are suspended in a lymph bath inside the hollow spaces of the bony labyrinth.

(c) It has been suggested that apart from these gross mechanical changes (a) and (b), the explosion and the loud noise may destroy the delicate nerve endings in the cochlea and so result in paralysis. The loud sound due to the explosion may paralyze the hair cells of Corti's organ, somewhat in the same way as the nerve structures of the macula in the retina are paralyzed by the rays of the sun in "eclipse" blindness. According to this theory, "shell" deafness, like "noise" deafness, is due to paresis or paralysis following overstimulation. Some observers hold that the change is a biochemical one, while others believe that it is of a molecular nature. Theodore has microscopically examined one case of labyrinth concussion followed by total deafness, and found a condition of degenerative neuritis similar to that described by Manasse and Wittmaack in old people.

(d) It has been stated that in cases of "shell" deafness the lesions are probably to be found in the brain—e. g., hemorrhages in the pons, medulla, and cerebellum, involving the central connections of the auditory and vestibular nerves. Milligan and Westmacott have suggested that shell deafness is due to a temporary interference with the neuron connections in the higher brain centers. They believe that the abrogation of function is not due to an organic lesion.

Severe Complications of Suppurative Otitis.**BRINDEL.**

Rev. de laryngol., Paris, 1917—XXXVIII—1.

In one year there were 3,110 patients admitted to his service, of which 1,550 were hospital cases. Six died from auricular complications and four others, though seriously ill, were saved.

Of the 3,100 cases, 800 were affected with ear discharge (350 acute and 450 in which the discharge had lasted for some time). Mastoid complications occurred 108 times, 78 due to recent suppuration and 30 to exacerbation of an old otorrhea. Of the ten severe cases already mentioned, five were acute and five were due to an acute recurrence. The following were found in the ten cases: Meningitis, five times, with four deaths; brain abscess, one death; pyemia, once, death; labyrinthitis, recovery; extradural abscess, one, recovery; extradural abscess, one, recovery; sinus thrombosis, one, recovery. Conclusions:

1. That intracranial complications of otitic suppurations are very dangerous, and surgical treatment is more efficacious from a preventive than curative standpoint.

2. Half of the complications may be avoided if attention is paid to the cure of chronic suppurations. A good portion of the other half will be prevented if early and radical intervention is undertaken as soon as there is any danger of mastoiditis.

3. Erysipelas, in the course of an acute suppuration, increases the virulence of the pathogenic germs and favors meningitis.

4. A discharge of the ear may be the cause of cerebrospinal meningitis.

A Contribution to the Etiology of Shell Shock.**WILTSHERE, H.**

Lancet, Lond., 1916—I—1207.

Wiltshire offers the following conclusions as to the etiology of these conditions:

1. The wounded are practically immune from shell shock,

presumably because a wound neutralizes the action of the psychic causes of shell shock.

2. Exposure and hardship do not predispose to shell shock in troops who are well fed.

3. While it is theoretically possible that physical concussion resulting from a shell explosion might cause shell shock, it is certain that this must be regarded as an extremely rare and unusual case.

4. Chemical intoxication by gases generated in shell explosions cannot be more than a very exceptional cause of shell shock.

5. Gradual psychic exhaustion from continued fear is an important disposing cause of shell shock, particularly in men of neuropathic predisposition. In such subjects it may suffice to cause shell shock *per se*.

6. In the vast majority of cases of shell shock the exciting cause is some special psychic shock. Horrible sights are the most frequent and potent factor in the production of this shock. Losses and the fright of being buried are also important in this respect. Sounds are comparatively unimportant.

7. A consideration of the causes and frequency of relapses favors an original cause of psychic nature.

8. Any psychic shock or strain may cause a functional neurosis, provided it be of sufficient intensity relative to the nerve resistance of the individual. Such shock or strain need not have any connection with "sex complexes."

Injury of the Auditory Organ by Detonations; How Can They be Cured?

WICART.

Bull. Acad. de méd., Paris, 1917—3, s.—LXXVII—51.

Injury to the ear is exceedingly common by reason of the extreme bombardment and violent attacks which the present war has brought about. The detonations attack the auditory organ either by way of the labyrinth or the middle ear, or both. The external ear comes into play only insofar as it contributes to the results, when there is a mass of cerumen in the external auditory canal; especially if it is hard, it may be

forced through the tympanic membrane. The labyrinth is most affected of all the elements of hearing. Vertigo, tinnitus, stupor may persist for a long time; long bombardment, with explosion of shells, furnishes easy proof of this. In this connection, minute analysis of the organs and of the therapy demonstrates that isolated attacks of the labyrinth produce only passing disease, easily curable and without any real destruction; without lesion of the middle ear, and without persistent compression through the organs of transmission, the labyrinthine concussion disappears quickly with the rest. It must be the explosion of shells which produces the great majority of cases of loss of hearing.

By the repetition and violence of these air shocks, the middle ear becomes congested, even up to hemorrhage, or there may be small intratympanic hematoma, resulting later in large perforations.

All these traumas are only the very reduced consequences, without complications, which depend on the previous state of the subject, and which are the true causes of the great majority of destructions of the auditory organ. These observations, based on numerous patients seen in consultation, justify the following conclusions:

1. Ears that have been previously attacked with suppuration, with actual cicatrization of the tympanic membrane, are the most susceptible to detonations.

2. Traumatized ears which suppurate at the same time may owe this suppuration and all these complications which result to the mucopurulent nasopharyngeal catarrh; the otitis which disturbs, little by little, the function of the labyrinth, and the largest incurable perforations of the tympanic membrane, are the consequence.

3. When one ear is attacked, or when one ear remains affected while the other is cured, there is nasal and tubular obstruction on the diseased side from catarrh, turbinate hypertrophy, deviation of the septum, etc.

4. Cephalic congestion, toxic hypertension, syphilitic, sclerotic, malarial, arthritic, etc., present often after the trauma labyrinthine phenomena, are apparently connected with the internal ear and are due in reality to disorders of the middle ear. In these cases general treatment should be given in

connection with local treatment, the last being addressed to the nasopharyngotubular conditions.

5. Suppuration of the middle ear rarely remains longer than five to ten days after traumatism.

Prophylactic Measures.—The ordinary precautions against detonations consist in placing cotton in the canal and opening the mouth at the time of firing. For these it is well to substitute the following: To open the mouth by yawning, or better, to swallow strongly several times while the nose is compressed between the two fingers in order to open the tubes at the moment of detonation; to cover the auricular canal and the mastoid with a pad of cotton, after having previously filled the canal with a mesh of absorbent cotton saturated with glycerine.

Primary Treatment of Gunshot Wounds of the Ear.

KLESTADT, W.

München. m. Wchnschr., 1916—LXIII—1499.

In the absence of visible associated injury of the bony framework of the head and the soft parts at or near the ear, active measures and otologic consultations are not usually called for. On the other hand, treatment by a specialist is urgently required in the presence of labyrinthine symptoms, or when the gunshot wound has been added to a long standing unhealed ear suppuration. In a general way, gunshot wounds of the ear are treated in accordance with the principles governing the surgical treatment of gunshot wounds of the skull. Middle ear wounds are left alone, unless they give evidence of infection and endanger life. On the first signs of middle ear infection, active treatment must be instituted. All other ear injuries which are known to take an unfavorable course without operation and which are apt to induce remote sequelæ call for surgical interference. Foreign bodies should be removed as soon as possible, with the assistance of radiography. Small wounds on the surface of the petrous region should be carefully examined, because of the possibility of serious hidden lesions. After operations on the petrous pyramid, the pa-

tient should be kept at rest a suitable time before transportation to another hospital.

Summarizing, the primary attitude toward indirect ear injuries is passive, while towards gunshot wounds of the ear itself is active.

Aural Prostheses.

PONT, A.

Brit. Dent. J., Lond., 1916—XXXVII (War Suppl.)—382.

Up to the present time recourse has been had to appliances in vulcanite, metal, and porcelain, concerning which there is nothing in particular to mention except as regards the means of retention, and from this point of view one must consider three things:

1. Total absence of the pinna.
2. Presence of a larger or smaller stump more or less deformed.
3. Absence of a portion of the pinna, the portion remaining having a normal form.

(1) The total loss of the pinna. The apparatus is retained by two means which are complementary to each other. In the first place, by means of gold wires enclosed in soft rubber and making springs. Two or three of these springs go away from the apparatus to which they are fixed, diverging one from the other. When fixing the apparatus one draws them together and introduces them into the external auditory meatus. Once in place they firmly hold the apparatus by the pressure they exercise against the walls of the passage. The second means of retention consists in a shaft of steel, similar to the sidepiece of spectacles, which goes away from the posterior side of the artificial ear, concealing itself in the hair and making a point of contact by bending over the top of the skull.

(2) Where only a more or less deformed stump of the ear remains to be replaced, one can make use of a first means of retention in the external auditory meatus, as in the preceding case, and by a second retention appliance made by a screw or hook passing across a perforation which has been made arti-

ficially in the stump. If the stump is flattened and offers enough resistance one can, as Martin did, make an artificial ear in two parts, one fitted into the other, like a box and its lid, encircling the stump, which in its turn, holds up the apparatus.

(3) Where the pinna is defective in part, the missing part of the ear may be made, and this artificial portion is retained, either with some hooks passing into one or two perforations of the ear, in case of need securing the stability and the immovability of this apparatus, whether with a spring into the external auditory passage, or with a little shaft of steel passing behind the pinna of the ear and bending slightly in front.

This type of prosthesis is inconvenient on account of the weight and fragility of the apparatus, and, above all, the necessity of combining the means of retention, which are complicated and sometimes hardly trustworthy. For this reason Pont decided to use the plastic paste in case of a partial or total loss of the pinna of the ear. A model of the region of the ear was taken, and from this model a wax ear was made. Into this model, which is made into two parts, the plastic paste, which had been previously melted in a water bath, is poured. After half an hour the ear is taken from the mould, the surplus of paste was cut away and the ear was put into place and fixed with paste.

Double Facial Paralysis of Traumatic Origin.

HALLEZ, G. L.

Rev. d. laryngol., etc., Paris, 1918—XXXIX—25.

Facial diplegia from nonsurgical causes is seldom met with in the isolated state. Sainton in 1901 devoted a comprehensive work to this subject, but we have never encountered a case.

Traumatic facial diplegia seems to be of still rarer occurrence, and Sainton in his work cites only the three cases of Gama, Romberg and Calowski. To these are to be added that of Bayer of Brussels and two observations published since the war, the one by Chatelin and Patrikios, the other one by the writer and R. Oppenheim.

On account of the rarity of these cases, of the absence of autopsy or of surgical intervention, the probable nature and seat of the symmetrical lesions of the seventh pair have not been precise. Nevertheless, the facial diplegias observed following injuries have all presented, up to the present, the characteristics of peripheral paralysis.

Mention must be made of obstetric diplegia due to the compression of the facial nerve by the two spoons of the forceps, the published cases of which are extremely rare.

The surgical cases are almost always due to a fracture of the two petrous bones: immediate traumatism (sharp compression between two resisting bodies) or mediate traumatism (transverse fracture of the two bones consecutively, from a fall backwards, on the occipital region—see observation II) or to a violent shock on this point, by a weapon or projectile.

As simple paralysis of the same origin, facial traumatic diplegia can be produced immediately by a serious and immediate injury of the nerves (section of the nerve trunk, hemorrhages of the fallopian canal or of the internal auditory meatus) or, on the contrary, successively, slowly, at the end of several days; it is then generally progressive, more benign; it is the compression which interferes especially. It may result from a slight fallopian hematoma, a reparative or neighboring periostitis (bilaterally suppurative otitis following a rupture of the tympanic membranes). Finally a simple neuritis can exist with congestion of the nerves which are found henceforth confined in their bony inextensible canal.

As for the wounds of the cheeks or of the temporal parotid region by a war projectile, not considering the serious mutilations of the face, they involve very frequently all or part of the facial nerve, but we may search in vain through the most interesting observations of Moure, Lermoyez and Morestin for the description of wounds symmetrical enough to realize the facial diplegia type. Independently of these diverse courses, and of the meningeal hemorrhages capable of injuring the nerve trunks in their intercranial passage, between their origin and the internal auditory meatus, we may ask, in the light of the pathology of war, if the deflagration of the explosives may not be responsible for this syndrome. Perhaps the rapid force of the explosive shock transmitted "thirty fold" to

the labyrinth by the tympanic membrane and the ossicles (Lermoyez) can produce hemorrhages in the fallopian canal severe enough to cause its inhibition. We know now enough cases of hemorrhages distant from the nerve axis to admit, at least in theory, the possibility of such a mechanism.

Whatever it may be, a facial traumatic diplegia is concerned in reality only with the juxtaposition of two simple facial paralyses, and we are concerned only with the particularities which depend on the association of these two monoplegias. Contrary to that which is observed in clinical medicine, the bilateral paralysis is generally simultaneous unless the injuries of the two petrous bones are of very different character.

In fact, the two halves of the face are not affected in an absolutely symmetrical way, and almost always the paralysis predominates on one side or the other. The difference of aspect is due either to the dissymmetry of the initial injuries or to the unequal rapidity of their restoration. The aspect of the wounded is characteristic; he presents the physiognomy of a statue; the face is like an expressionless mask, says Salnton. No movement of the mind and of the heart is expressed by the features, which are fixed.

The skin of the forehead is entirely smooth, the wrinkles of the face have completely disappeared, and the subject seems rejuvenated. The eyebrows are less arched, the lids, constantly half opened, let the tears fall, the nasolabial grooves no longer exist, and the opened lips sometimes let the saliva escape, and the wounded man must staunch it almost continually with his handkerchief.

The eyes preserve a strange fixity because the lids do not touch. In observing the sign of Charles Bell (superior external rotation of the ocular ball in the efforts of voluntary closing) which exists to right and to left, he happened to find the sign of Négro which distinguishes which is the side most involved: in looking up as far as possible, an asymmetry in the position of the eye may be noted; that of the more paralyzed side describes a greater rotation in height and comes to a higher level than the other, showing that the phenomenon of the substitution reflex of MacCarty (fibrillary contractions of the orbicularis by percussion of intraorbital nerve) was lost on the right and left side.

There is a singular contrast between the precision of the answers to questions asked and the stupefied aspect of the inert face. The nostrils are immovable, laughing and crying are manifested only by a different expression of the glance and by the coloring of the face. "It is a peculiar thing to hear a laugh from a face that expresses nothing" (Hallion).

Lateral movements of the tongue are possible, but it can neither be extended outward nor curved upward. Mastication is very painful because of the paralysis of the cheeks; food gets in between their flaccid walls and the dental arch. Pronunciation of certain letters as, for instance, the labials, is quite difficult, and speech becomes often incomprehensible. They can neither whistle nor whisper.

The palate is generally intact, because its muscles are enervated by the vagospinal and the trifacial (Lermoyez). Disturbance in taste is common and is localized in the two anterior thirds of the tongue. An edema of the two cheeks is constantly marked, accompanied by disturbance of the perspiratory reaction of the face.

The reaction of degeneration is almost always present. Although the injuries are usually peripheral, a predominance of diplegia in the region of the inferior facial may be observed either from the beginning or after a certain time. This particularity is not surprising. Moure has shown us, apropos of the facial paralysis of war, that an injury, especially over the trunk of the nerve itself, may cause a dissociated paralysis, localizing itself preferably on the fibers of the inferior facial. Moure proposes the following explanation: the funicular portion are composed of peripheral fibers related to the muscles of the lower part of the face, and the central fibers are attached to the upper muscular group. The peripheral fibers would then be more sensitive and more exposed to irritation of external origin. One can thus conceive that the less serious alteration of the central fibers or their more early restoration cause a simple paresis of the forehead and of the orbicularis palpebrarum contrasting with a real paralysis in the region of the inferior facial.

The observations which follow present in totality the symptoms which have just been described:

Case 1.—Wounded man had a double facial paralysis of the peripheral type of about six weeks' duration. The paralysis was absolute on the left side; on the right side the very slight movement of the eyelid was possible.

The aspect of the face is characteristic—forehead smooth, cheeks pendant, half opened eyes, etc. Speech was almost incomprehensible; mastication and especially swallowing of liquids very difficult. Electrical examination showed an actual reaction of complete degeneration for the facial nerve of both sides.

The interest of this observation rests in the cause of the diplegia. The wounded man was in the act of discharging a dung cart which suddenly recoiled; his head was pressed transversely between a wall and the back of the heavily loaded cart. As soon as he was freed his left ear bled, and diplegia, it seemed to him, was manifested immediately (this point is difficult to determine). His face was swollen for several days; he had numerous ecchymoses in the temporomalar region, and swallowing was very painful on account of the trismus which disappeared in several days.

Apparently the nerve was injured on each side in the petrous bone by a transverse fracture of the base of the skull, although there was no symptom in relation to an important injury of the auditory apparatus.

Case 2.—Soldier, twenty-eight years old, wounded at Douaumont on the 27th of October, 1917, by the bursting of a large shell near by. He suffered immediate loss of consciousness, followed by prolonged amnesia. He had no external injuries, but suffered facial diplegia, bilateral otorrhea, abundant epistaxis and slight left mydriasis. During the first few days he fell into a semicomata; then when he recovered he complained of intense vertigo with nausea. He could hear with difficulty on the right side, but not at all on the left. The epistaxis and the hemorrhages of the auditory canals were renewed with a certain frequency. He had the typical aspect described before: the corneal reflex and the reflex of MacCarty were abolished on both sides; the cornea was sensitive; the pupil was on a higher level on the side where the facial paralysis was especially marked (signs of Charles Bell and Négro associated). There was no trace of ocular paralysis; diplopia sought for

with care was not present. The pupils were equal and react normally. No nystagmus; normal visual acuity; no modification of the visual field, in particular no hemianopsia; speech slow; the labials especially difficult.

There was no difficulty with deglutition. Following a violent emotion the patient presented mutism almost absolute for four days. The cheeks were flabby and mastication painful.

The diagnosis was immediate peripheral facial diplegia of traumatic origin with left labyrinth concussion and rupture of the tympanic membranes with double consecutive suppurative otitis with deafness on the left side.

The diagnosis of traumatic and organic facial diplegia will be almost always easy. It will not be difficult to recognize that it must be related to a peripheral injury, the seat of which within the petrous bone, will be determined by the symptoms carefully analyzed and by the signs associated with fracture of the petrous bones and disturbances more or less marked of the part of the eighth pair.

After a concussion, a shock followed by loss of consciousness and the absence of external injuries, the question of a hysterical or functional diplegia must be considered. The absence of disturbance of the electric reactions, the integrity of the MacCarty and corneal reflexes, the absence of the sign of Négro, paresis rather than true paralysis, the almost absolute integrity of the superior facial region, the absence of muscular hypotonia are of help to establish the diagnosis of hysterical diplegia.

Finally, in the cephalic tetanus of Rose, we may look for a toxic infectious tetanus facial diplegia, the origin of which could be ignored and connected with the traumatism itself. It is there that the appearance of the slightest tetanus must be watched, for the difficulties of deglutition and the painful intermittent contractions, in order not to fail to give the patient the benefit of an intensive preventive treatment.

The treatment of traumatic facial diplegia is connected naturally with that of simple paralysis; it can be purely physiotherapeutic; it may be aided particularly by the galvanic current, associated with the faradic at slow intervals, if the paralysis is accompanied by R. D. partly active, and by the gal-

vanic current in the case of R. D. partially pronounced, or of R. D. total.

In general, the functional prognosis remains serious, and the question of surgical intervention should be considered finally, whether a direct operation on the nerve, whether liberation or anastomosis (Moure), or an operation on the soft parts, following the technic of Morestin, to try to correct the total paralysis of the face so apparent and so painful to the patient.

A New Method of Examination of the Vestibular Labyrinth.

MOURE.

Rev. de laryngol., etc., Paris, 1916—August 31.

Moure describes a simple and novel method for testing out the labyrinthine function, employed because of its convenience in tests made on the French soldiers. It is based on a principle contained in a game of children, which consists in turning around a number of times with the head bent over to touch a cane and with the eyes closed. If a person with normal hearing does this five or six times, the feet being kept close together, and then suddenly stops, raises the head and opens the eyes, it will be impossible for him to walk straight forward. He will always take a step in the direction opposite to the first foot employed—that is to say, if the first step is taken with the left foot he will fall or step forward toward the right, and vice versa, if the first step is taken with the right foot he will fall or step toward the left.

In the hypoexcited labyrinth the amount of deviation will be more or less reduced, according to the degree of labyrinthine involvement, until in the totally dead labyrinth the patient will have no difficulty in walking directly forward. In case the labyrinth is hyperexcited it will be necessary to do the turning with less vigor and a fewer number of times. The normal reaction will be correspondingly intensified.

Harris.

Otosclerosis.

FREDERICK, M. W.

N. York M. J., 1918—CVII—153.

The writer acknowledges at the onset that nothing new in the way of therapeutics has been achieved, and although

he has nothing new to present he feels no hesitancy in bringing it before the profession. In this way he hopes to stimulate the younger men to take up this study and pursue it to some beneficent end.

Concerning the pathogenesis: this seems to be the most important part of the subject, since the therapeutics depends upon the pathology. Unfortunately the majority of the cases have been microscopically doubtful, as they have occurred in old people in whom bone and nerve changes are apt to be present. This again emphasizes the importance of recognizing the disease in its early stages and of examining histologically the petrous bones of those showing signs of otosclerosis and of those young people in whose families otosclerosis has occurred but who have presented no clinical symptoms in themselves.

There are three well defined views as to the pathogenesis. Politzer thinks the disease begins in the bony labyrinth but denies that the bone islands are spongiosa. Siebenmann believes that the disease originates in the bone and that the bone islands are spongiosa. Habermann found compact as well as spongy bone and places the process in the periosteum. Since the disease comes on so insidiously and manifests itself only after serious functional changes have taken place with so few local causative changes and such a decided hereditary feature, it is not to be wondered at that most of the constitutional dyscrasias have been accused plus a local predilection. Syphilis has been blamed by many and denied by others. Habermann after a thorough study is convinced of the causal relation between otosclerosis and syphilis. Later investigations have proven this to be untrue. First—Because the aural affection does not occur in proportion to the number of syphilitics. Second—Men are more frequently infected with syphilis than women, while otosclerosis is especially a disease of the female sex, and third, the Wassermann reaction invariably gives results which speak against leutic etiology. The author nevertheless sees a causal connection between otosclerosis and syphilis in spite of the absence of other stigmata of hereditary syphilis, negative Wassermann tests and the negative value of antisyphilitic medication. He considers the bone changes in otosclerosis identical with the bone changes in syphilis. Nager and Alexander are both quoted—showing that

middle ear affections in congenital syphilis as in other severe constitutional derangements show a marked tendency to break into the labyrinth. Otosclerosis is a disease which becomes apparent as a rule in the second and third decenium and it is a well known fact that the Wassermann test is frequently negative in congenital syphilis—over twenty years of age.

The proponents of the congenital syphilis theory hold that otosclerosis is a highly attenuated form of lues and that the inefficiency of antiluetic treatment is due to its being used too late to do any good. Many authors insist on the marked vulnerability of the acoustic nerve from all kinds of noxa, and that such a searching virus as syphilis should find this easily wounded member is no surprise. This explains the nerve affection—to explain the osteospongiosis he quotes from Brooks' textbook of pathology. In congenital syphilis there is a pathognomonic change of the chondroosseous junction. An osteochondritis syphilitica is frequently observed which appears as a yellow white line at the epiphyseodiaphyseal junction. This line corresponds in its position to the zone of provisional calcifications. In healthy children the latter forms a very small, scarcely visible line of demarcation between the epiphysis and the diaphysis. This small line is transformed by hereditary syphilis into a broad, distinctly visible line which consists of calcified but dead cartilaginous tissue for the calcification occurring in syphilis in a definite variety, a kind of petrification which corresponds to a necrotic process. The dead cartilage excites proliferation in the neighborhood which under certain circumstances may lead to complete dissection of the cartilage from the bone so that a kind of fissure is formed between them.

This picture is easily recognized in many of the temporal bones of otosclerosis.

He presents nothing new for diagnosis and therapeutically feels that up to the present time nothing really worth while has been brought forth that merits our attention. Radium has proven itself valueless. The noises are temporarily lessened, which is explained by the selective action of the radium which attacks nerve elements furthest below par, and put them out of commission for a time, but when they recover the noises return, which perhaps also explains the temporary improve-

ment in hearing. The major operation of resection of the acoustic for the relief of extensive head noises is no longer necessary, if the patient is willing to accept complete deafness, as this can easily be brought about by radium without the slightest danger to the general health. Several applications of a strong pencil—2-3 mgm.—for a period up to forty minutes will entirely destroy the terminal acoustic without injury to the surrounding tissue. The most important thing in otosclerosis today is the prophylactic side, into which the author goes extensively.

Ira Frank.

Mastoiditis.

HUNTINGTON, WM. H.

Med. Rec., New York, May 18, 1918.

Summarizing the conditions which would indicate the simple mastoid operation, we find:

1. Cases of acute mastoiditis, with persistent pain on pressure over the tip or antrum. Persistence of fever after a successful paracentesis has been done or in which we find a sagging of the posterior superior meatal wall.
2. Cases of acute suppuration of the middle ear, with dizziness, vomiting, nausea or beginning facial paralysis, or with signs of intracranial or labyrinthian involvement.
3. Cases of long standing middle ear suppuration which resist all local measures, and because of good hearing and other reasons do not indicate a radical mastoid.
4. Cases of persistent mastoid pain, either with or without other symptoms, which cannot be accounted for in other ways.
5. Cases of subperiosteal abscess.

Emil Mayer.

A Case of Otitic Thrombophlebitis With Pyemia, Accompanied by Gradenigo's Syndrome; Operation; Recovery.

C. CALDERA.

Arch. ital. d. otol., etc., Napoli, 1918—XXVIII—321.

An artilleryman who entered hospital with the complaint of otitis had suffered for twenty days. Otoscopic exam-

ination showed copious discharge of pus in the left auditory canal and the tympanic membrane red and bulging. There was pain in mastoid region. Ichthyl was used with no improvement. Severe pain continued; temperature, 39.2° C., rising to 40.9° C. Operation August 24, 1917: Morphin chloroform anesthesia. Mastoid cells being opened were found full of creamy pus and granulations. Lateral sinus was laid open for the distance of a centimeter; thrombosis could not be established, and it was decided to wait and perform a second operation. Iodoform gauze dressing. For the next four days the pyemic character of temperature was maintained, oscillations being between 37.8° and 40.4° C. August 29th it was decided to open the sinus, which was uncovered upward toward the torcular Herophilli and downward toward the bulb, in all for a distance of three centimeters, exposing the mastoid emissary vein. The thrombus thus laid bare, was found filling the lumen of the sinus. The thrombus was removed with a spoon and the sinus curetted. Iodoform gauze dressing. Daily endomuscular injections of six cubic centimeters of phenol, injections of four cubic centimeters of 20 per cent camphorated oil and later endovenous injections of electrargol in doses of five to ten cubic centimeters. Patient gradually improved, pain disappeared and finally recovered.

Grave Complications of Suppurative Otitis.

BRINDEL.

Rev. de laryngol., etc., Paris, 1917—XXXVIII—1.

In civil life the practitioner who is not familiar with the grave possibilities of suppurative otitis is inclined to indifference toward it, and the patient readily takes the same attitude, being averse to operation or radical treatment by an aurist for a painless and apparently trivial ailment. On the other hand, the soldier, for various reasons, willingly submits himself for treatment; indeed he may complain of his ear trouble to avoid being sent to the front or to procure his evacuation. At the military otologic hospital in Besancon, Brindel states that in a year 3,100 patients were examined and 1,550 ad-

mitted. Of the 3,100 examined, 800 were sent in because of an ear discharge—350 acute, 450 chronic. One hundred and eight of the 800 required operation for mastoid complications—78 from acute otitis and 30 from chronic otitis with acute recurrences. Ten of the 108 cases were extremely grave, and to these the writer devotes the greater part of his paper. Summarized, the ten cases were as follows:

1. Cerebrospinal meningitis (meningococcal) complicating a streptococcal meningitis of otitic origin, in the course of an acute suppurative otitis media, with latent mastoid osteomyelitis. Fatal.
2. Meningitis of a cerebrospinal character, but without the meningococcus; acute suppurative otitis media with no mastoid involvement. Fatal.
3. Otogenous meningitis with multiple foci in a case of recurring otorrhea. Three operations (simple, radical, exploration of lateral sinus). Recovery.
4. Acute generalized meningitis following acute suppurative otitis media, aggravated by erysipelas. Fatal.
5. Acute generalized meningitis following acute suppurative otitis media of grippal origin. Mastoid operation in two stages. Fatal.
6. Probable cerebral abscess. Old suppuration, middle ear. Mastoid operation; cholesteatoma, extensive destruction of antral roof. Death from superacute meningitis due probably to rupture of an abscess under the meninges.
7. Chronic recurring otorrhea. Acute mastoiditis with extradural abscess. Pyemia. Radical operation. Death in three days from purulent infection.
8. Old recurring otorrhea. Labyrinthitis. Radical operation, opening of labyrinth. Recovery.
9. Subacute suppurative otitis media following a Valsalva. Mastoiditis; extradural abscess. Mastoid operation. Recovery.
10. Old recurring otorrhea. Signs of phlebitis of the sinus, with cerebral symptoms. Radical operation, arrest of infective process, cure.

From these ten cases Brindel concludes:

Intracranial complications of suppurative otitis are very dangerous, and surgery is more efficacious as a preventive than as a cure.

Half of these complications could be avoided by treatment of chronic suppurations; a good part of the other half would not occur with radical and complete operation as soon as mastoiditis threatened.

Erysipelas in the course of acute suppurative otitis exalts the virulence of pathogenic germs and favors the onset of meningitis.

A discharge from the ear may be the cause—if not determining, at least occasional—of cerebrospinal meningitis.

A. Miller.

Case of Posterior Mastoid Cellulitis; External Fistula; Extradural Abscess.

ROZIER.

Revue de laryngol., etc., Paris, 1917—XXXVIII—105.

A soldier, thirty-three years old, following an acute otitis media with profuse discharge two months previously, developed an abscess about three centimeters behind the external meatus. This was incised at the evacuation hospital. The wound continued to suppurate profusely, and the patient was sent to a central otologic hospital. Here the wound was reopened and a small fistula near the parietooccipital suture was found. On trepanation a considerable area of the internal table was seen to be destroyed and the sinus wall was reddened and covered with a fungous mass. The affected area was separated from the normal antrum by thick healthy bone. Aberrant mastoid cells have previously been described by Moure (1901), Richard, Lermoyez and others. The posterior cells seem to occur in three groups: (1) Posterosuperior, comprising the cells of the posterosuperior angle of the mastoid, near the parietal, and in relation to the cranial cavity, meninges and angle of the lateral sinus. (2) Posterior mastoid cells, on a level with the antrum, extending to the sigmoid fossa, and even to the occipital suture. (3) Posteroinferior, near the digastric fossa, and along the lower portion of the sinus.

A. Miller.

Measuring Perception of Two Successive Sounds.**MAURICE.**

Rev. de laryngol., etc., Paris, 1917—XXXVIII—129.

Opinion is general that persons with impaired hearing have retarded perception to some degree. It is this retardation which obliges us to speak to them very slowly, and which causes them sometimes to ask for the repetition of a question but respond to it before it can be repeated. Richet and Galle found that the normal ear could distinguish articulate language if the rate of emission was below ten or twelve syllables per second. Escat has prepared a series of test words to be used in testing the rapidity of perception, but the plan has certain obvious disadvantages. Maurice's apparatus consists in essence of a telephone in which sound is made and stopped, respectively, by means of two weights set to fall from various heights, and the usual revolving drum and stylet for recording time intervals. With this instrument Maurice has found that ears considered normal appreciate two sounds at an interval of five to ten thousandths of a second, while in the deaf the time may be increased to forty or even sixty thousandths of a second.

A. Miller.

War Injuries of the Ear.**MOURE AND PIETRI.**

Rev. de laryngol., etc., Paris, 1917—XXXVIII—154 and 186.

An endeavor is made to answer the question: "What shall be done by the examining surgeon in cases of trauma of the auditory apparatus?" These cases comprise: (1) Deafness from a lesion of the transmitting apparatus, in which event it should be determined whether it is a result of the wound or existed prior thereto; (2) deafness without any objective lesion of the ear; (3) deafness due to injury of both transmitting and receiving apparatus; (4) injury to the receiving apparatus with previously existing impairment of transmission. Especially must be determined the psychic element and the factor of exaggeration in each of these classes, especially

the last three. Accordingly, the auditors describe the various tests for audition and equilibration, including cranial perception of the watch, auditory perception of watch and voice, the Weber, Rinné and Galton, transmission by general sensibility, tests with the deafener; spontaneous nystagmus excited by rotation temperature (hot and cold water), and the Moure test, static test, galvanism, etc. Normal and abnormal reactions are compared. The authors carefully describe cerebral (psychic) deafness, simulation and exaggeration. The two latter are to be distinguished from each other, exaggeration being more common than actual simulation. In cerebral deafness the patient is apathetic, slow of gait, automaton-like, answers questions in monosyllables or not at all, and avoids the direct gaze of the observer. The really deaf, on the other hand, watches the lips, is alert and on the whole just the opposite of the cerebral type. The exaggerator seeks to exploit his aural pathology by pretending that it is more than it actually is, and overplays his hand. The simulator is rather easily detected by discrepancies in the results of the various tests, notably the Rinné and Weber, their combination with the artificial deafener, pretended stopping of the ear with a canalized rubber tip such as is used in tubal catheterization, and pinching one or the other branch of the biauricular tube. Dundas Grant has observed that if a shrill sound (whistle) is perceived the pupils first narrow, then dilate; when the sound is no longer heard the pupils again contract to normal. This test is of obvious use. The Lombard deafening test causes the subject to raise his voice in answering questions; in complete bilateral labyrinthine deafness the voice will not be changed by this procedure.

A. Miller.

New Apparatus Using Hot and Cold Air for Evoking Rhythmic Nystagmus.

ROZIER.

Rev. de laryngol., etc., Paris, 1917—XXXVIII—241.

In using cold and hot water for testing the integrity of the labyrinth, vertigo, vomiting and syncope are nearly always induced. This is objectionable, especially in examining wounded soldiers. Dundas Grant has employed air instead of water,

using a coil of copper tubing, cooling the coil with ethyl chlorid, and forcing air through the tube into the ear by means of a thermocautery bulb. Ethyl chlorid is expensive and difficult to procure in these times, so Rozier, using apparatus similar to that of Grant, cools the coil with ice and warms it with hot water (42 or 44 degrees Centigrade). The nystagmus produced is satisfactory for testing, and there is no vertigo, vomiting or syncope. A. Miller.

Suppurative Otitis Media Complicated by Cerebral Abscess and Suppurative Meningitis; Autopsy.

CHALMETTE.

Rev. de laryngol., etc., Paris, 1917—XXXVIII—25.

A soldier, twenty-six years of age, was stunned by a shell. He did not lose consciousness, but had a right otorrhagia. He was evacuated and later a suppurative otitis developed. On being sent to the trenches again he complained of headache and impaired vision, and was again evacuated. At this time he was found still to have a suppurative otitis, for which he was treated by lavage, etc., for a month. Then operation on the mastoid was done, the antral walls being found smooth and firm, without fistulae or sequestra. Two days afterward the patient's temperature rose and he complained of severe right sided headache, especially at the vertex; the pulse was slow (64 to 66), but no paralysis was noted. After a few days decided cerebral symptoms developed and culminated in attacks of Jacksonian epilepsy. Cerebral abscess was diagnosed and trepanation above the meatus was done. The dura was somewhat yellowish, but on opening it only clear cephalorachidian fluid escaped. Four punctures into the parenchyma failed to find pus. The symptoms then abated for a few hours, then recurred. Again exploratory punctures into the parenchyma were without result, and death occurred within a few days. At autopsy pus was found under the right dura, and there was a small abscess cavity in the first temporal convolution, behind the site of trepanation.

A. Miller.

II.—NOSE.

Influenza Sinus Disease and Its Relation to Epidemic Influenza.

ROBERTSON, H. E.

J. Am. M. Ass., Chicago, 1918—LXX—1533.

1. Epidemics of respiratory influenza (purulent tracheobronchitis) have been fairly severe in both the American and the British Expeditionary forces.
2. In the investigation of cases, both clinically and at post-mortem, little attention in the past has been given to the question of accompanying sinus disease.
3. Of eight fatal cases of purulent tracheobronchitis due to the influenza bacillus, all but one showed involvement of one or more of the sinuses at the base of the skull by inflammatory processes, probably in all cases, directly due to the invasion of these sinuses by the influenza bacillus.
4. In six patients that died from some other apparently independent infection, the sinuses showed influenzal inflammations.
5. Of two patients dying from accidentally received injuries, both harbored in their sinuses lesions giving pure cultures of bacillus influenzae.
6. Appropriate treatment of the sinuses in patients suffering from influenza often served to relieve the symptoms and apparently to hasten convalescence.
7. Investigation of the sinuses during epidemics of influenza is strongly recommended, and urged not only on therapeutic but also on prophylactic grounds. Emil Mayer.

Nasal Reconstruction, With a Note on Nature's Plastic Surgery.

AYMARD, J. L.

Lancet, London, 1917—888.

The greatest difficulty presenting itself is when the nose has been destroyed by war injury and the scar tissue surrounding the lost organ has to be utilized for the junction of the new flap. The most common cause of failure is probably due to the fact that the nasal cavity is not an ideal aseptic one any time,

but rendered much more unhealthy owing to the inevitable damage to one or more of the sinuses and their surrounding tissue. We are warned that the cause of failure is often due to undue haste, so the fact is emphasized that no plastic operation of any kind can possibly suffer through reasonable delay.

The following principles of nasal construction are given as essential: The flap should be taken, if possible, from the site likely to lead to the least ultimate disfigurement; the lining of the flap should take some other form than scar tissue; the new organ should as much as possible correspond with the original; the supporting framework should as closely as possible simulate the original; the bed area for the new organ should be most carefully prepared.

The author is using a new method, taking a long pedicle flap with its base near one clavicle and forming the nose upon the chest on the opposite side, keeping the head slightly bent upon the chest for fourteen days. Cartilage is formed by this time in the supporting framework for the following reasons: It will attach itself to bone exactly as bone will to bone, and the resistance of cartilage to mild sepsis is an argument in its favor, and furthermore, cartilage remains constant, whereas bone unattached is prone to disappear. Some of the common sources of trouble are dacyrocystitis, antrums sequestra, portions of nasal bones embedded in the cheeks and the condition of the patient's teeth. Concerning the removal of costal cartilage, the surgeon should first remove the costal cartilage and clean up the wound before proceeding to the head work, or an independent surgeon should do this part.

Ira Frank.

Ozena Among the Various Races of the Earth.

Roy, J. N.

Laryngoscope, St. Louis, 1917—XXVII—679.

The people of the earth are divided from the ethnologic standpoint into three families: white, red, and yellow, the Malays and redskins being represented in the Mongolian race.

Little is said in the article about the white race, as so much

has already been published. Some conclusions, however, are observed in cross breeds with the other races.

Careful study was made of the black race in Africa, America and Oceana. The nasal cavities of some five thousand negroes in twenty-two different colonies were observed, and the conclusion drawn that they do not suffer from ozena. A particular study was made of the nonpure races whose ancestors were Egyptians, Arabic, or so forth, in whose veins there was a certain quantity of Mongolian blood. There was little or no atrophic rhinitis. It was also unknown among the negroes in Oceana and the West Indies, but in returning to America three-quarters of the population of the black race were afflicted with this disease. The yellow race of Asia predisposed to atrophic rhinitis not only in the Chinese and Japanese but in the cross breeds as well. The frequency of the disease varies according to the condition, and the author has written a very interesting article in explanation of this. He has come to the conclusion that ozena is an infectious disease and is found in all races, less frequent in the black than among the whites, and most prevalent in the yellow race.

J. M. Shefferd.

Broken Noses, Their Pathology and Treatment.

CARTER, WILLIAM WESLEY.

Med. Rec., New York, 1918—XCIII—940.

He now performs a submucous operation, leaving a fair amount of cartilage along the upper margin of the septum to reinforce the bridge, which he constructs by transplanting bone after the recovery of the patient from the submucous operation and the bridge splint operation, which are done at one sitting. In applying the bridge splint in these cases it is absolutely necessary to mobilize completely the broken parts of the nasal arch, and in addition to this to remove all of the scar tissue that is accessible and utilize the nasal processes of the superior maxillæ, which are chiseled off from their attachment by means of a special chisel applied from within the nose. The dorsum of the nose is then easily raised to a normal position by means of the bridge splint, which holds it in position for about two weeks. At the end of this time the

nose has apparently been perfectly restored, and it has been, but not permanently, as experience has now shown. The contraction of the large amount of scar tissue, which is invariably present in such a nose, depresses the bridge, and within a few months the deformity is as bad as ever. He now prevents the return of the original deformity by transplanting bone and cartilage from the rib immediately after the patient has recovered from the bridge splint and submucous operation. The splendid restoration of the nose effected by the bridge splint is thus made permanent by the support of the transplanted bone.

The results secured by this combined, two stage operation have been excellent, and he is quite sure that they are permanent, as a sufficient time has elapsed to show. All of the work is done from within the nose and no operative scar results.

An extensive experience in this work convinces him that the rib is best suited for transplantation into the nose. In those cases where there is also a drooping of the tip, and it is necessary to extend the supporting transplant nearly to the end of the nose, he takes a transplant from the rib where it joins the costal cartilage; the upper two-thirds is composed of bone and the lower third of cartilage. The normal structure of the nasal bridge is thus restored and the flexibility of the tip is unimpaired.

The procedures here advocated for the treatment of traumatic nasal deformities and obstructions have been thoroughly tested in a large number of cases; there have been no serious accidents and the patients have been relieved.

Emil Mayer.

Ozena Is Not a Specific Microbial Disease.

DUVERGES, J.

Rev. de laryngol., etc., Paris, 1918—XXXIX—1.

Ozena is a local tropical affection, easily cured, and dependent on two factors: (1) The general condition of the patient. (2) The condition of his nasal respiratory function.

In certain affections where the nose has been cleared out, a few days after the operation a true ozena appears. It is difficult to believe that the patient could be attacked by a specific

bacterium necessary to form the crust and the odor, especially since a slow evolution characterizes ozena. It is more logical to suppose that this new pathologic state was the result of a new condition. A person with a nasal obstruction, suddenly having large nasal cavities, does not know how to breathe through his nose; and the secretions which are not drained form into crusts subject to all the microbic flora of the nasal cavities (odor).

No case of ozena resists the strict treatment following, even if it has persisted for twenty years.

Treatment.—The author's treatment differs radically from that of Robert Foy, who was the initiator of the reeducative method.

1. One of the bases of treatment is the freedom from all washing in spite of the pain.

2. To relieve the severe pain a vibratory massage should be used once or twice a day for the first few days to free the cavity from the crusts.

3. When the nasal reeducation is undertaken the patient should as often as possible inhale, deeply and slowly, with his mouth closed, and then to exhale in the same way. The rest of the time he must keep his mouth closed. However, this daily reeducation is insufficient to obtain a cure for ozena. Nocturnal reeducation is essential. To force the patient to breathe through his nose at night, he must wear a mask which will hold the mouth closed.

4. To relieve the pain during the first days and to get rid of the crusts between massages, the best method is to use inhalation and sprays of oil of vaseline with small quantities of chloretoine, menthol and eucalyptol.

5. The last point of the treatment concerns the general condition. This varies according to the disease (scrofula, syphilis, anemia, etc.). It may be necessary to use arsenic, iodotannic preparations, etc. Exercise is advised that develops the lung capacity and thoracic amplitude.

In general, if the reeducation is methodically practiced, the crusts will be considerably diminished in five or six days. At the end of the second month, sometimes before, there is no trace of crusts, there is a frequent almost watery discharge from the nose, the odor has disappeared.

At the end of the third month, sometimes at the end of the second, the patients are seen only once every six weeks to report on their condition and to assure us that reeducation is being practiced regularly. The patients who have followed the treatment are entirely cured at the end of a year.

III.—PHARYNX AND MOUTH.

Observations on Some Facial Deformities in Soldiers Repatriated From Germany.

PONT.

Lyon méd., 1918—CXXVII—84.

1. Wounded February 22, 1916. Repatriated July 12, 1917. Diagnosis: Loss of substance of the lower lip and mental region, incompletely covered by six autoplasties. The buccal orifice is elliptic, and the greatest occlusion leaves a space of about two centimeters between the lips. Complete absence of the chin caused by loss of the underlying bony structure. Comminuted fracture of the lower jaw at the level of the symphysis, with loss of bone extending from the first right molar to the first left. The two stumps of the horizontal branch are deviated to the side of the tongue and prevent the movement of that organ. The upper maxilla was likewise fractured, the fragments having reunited in a bad position under the influence of the cicatricial bridges of the lip and jaw. The upper dental arch has the form of a V, the summit corresponding to the left first premolar. The patient constantly dripped saliva and had to wear a bib. He stated that he had worn a prosthesis composed of an arch and two rings, one of which is still in place. The teeth to which they were attached having become abscessed, the arch was removed, so that the reduction obtained was nullified. Remnants of roots of teeth causing intense gingivitis. As a result of absence of mastication and constant loss of saliva, the general condition of the patient was very bad. Treatment: Replacement of the bony fragments, to be followed by plastic.

2. Wounded May 19, 1916. Examination showed a double fracture of the inferior maxilla at the level of the first molars,

right and left, with loss of bony substance, and consecutive double pseudoarthrosis. The intermediate fragment is loose and is slightly retracted from its normal position, while the ascending rami are drawn upwards by the action of the pterygomasseter band.

The patient stated he had received an apparatus to hold the bones in position, but it did not fit and caused pain. It was removed in forty-eight hours and no further treatment given.

3. Wounded October 1, 1914. Repatriated September 5, 1917. Transfixion of the face by a ball entering on the left side at the level of the free border of the lower lip near the commissure and leaving on the right at the level of the angle of the jaw. Fracture of the lower incisors and lower jaw at the region of the molars. Fractures not reunited, pseudo-arthrosis at the angle of the jaw. Loss of thirteen teeth in the lower jaw.

4. Wounded August 22, 1914. Repatriated June 30, 1917. The projectile entered the left zygomatic arch, which it fractured, and having traversed the face, made its exit behind the right sternocleidomastoid at the junction of the middle and upper thirds. Depression at entrance and adherence of bone to skin. Complete constriction of the jaws, with opening of less than one millimeter. Complete absence of mastication and movement lower jaw. He had undergone six operations without benefit.

5. Wounded October 6, 1915. Repatriated December 9, 1916. Comminuted fracture of the nasal bones with obliteration of dorsal aspect. Complete atresia of nostrils, which are completely obstructed.

Nasopharyngeal Hemorrhage, After Concussion from Shell Explosion in a Patient Affected with Arterial Hypertension.

CROUZON, O.

Bull. et mem. Soc. méd. d. hôp. de Paris, 1916—3, S., XL—
1376-1378.

Crouzon reports a case of a man who was subjected to the circumstances of an intensive bombardment. He was very much fatigued, for he had not been in bed for nearly two weeks and had been subjected to a gas attack without having

a mask. At seven o'clock in the morning of his attack, a large shell exploded in the parapet where he was. He felt at the time a sensation of compression, followed immediately by one of expansion, and suddenly he was taken with hemorrhage from the nose and pharynx without any contusion having taken place. He coughed blood from the nose and mouth in large quantities, and it was not arrested for about two hours. The hemorrhage recommenced two or three hours later. While he was being taken away in the ambulance a gun bombardment occurred, and then the hemorrhage reappeared. In the train the hemorrhage continued until ten hours after it began. During the following three weeks he had two attacks. There were no changes of his visual field of organic character. According to the observation of the writer, the vascular condition prepared the ground for the effects of the commotion.

The Nose and Throat in Cervical Adenitis.

WOOD, GEORGE B.

N. York State J. M., 1918—XVIII—3.

The majority of cases of chronic cervical adenopathy are of the descending type. They usually begin with enlargement of the tonsillar lymph node. The next most important group has its starting point in the upper glands of the external group of the deep cervical chain placed just behind the posterior border of the sternomastoid. The chronic form of adenitis rarely begins with primary enlargement of the superficial chain. Practically the only direct afferent vessels running to the deep cervical chain come from some part of the upper digestive and respiratory apparatus, hence the importance of the mouth, nose and throat in the etiology of cervical adenopathy.

If the glands involved begin with those under the posterior portion of the sternomastoid muscle we can rule out the tonsils and mouth, and in the large majority of these cases the infection comes through the pharyngeal tonsil. Second, alveolar infections involve primarily the posterior gland of the submaxillary group, and where the tonsillar lymph node is primarily enlarged the infection almost surely comes through the faucial or lingual tonsils or possibly the lateral folds of the pharynx.

Emil Mayer.

Sarcoma of the Soft Palate.

VOORHES, B. G.

Laryngoscope, St. Louis, 1917—XXVII—632.

Patient, girl, aged ten years. Immediate family history negative; grandmother on father's side and three aunts on mother's side dead. Patient operated upon by family physician March 29, 1916 for adenoids. June 12, 1916, patient consulted the author for growth in the soft palate. She was suffering from dysphasia, anorexia, dyspnea, mouth breathing, loss of weight, slight rise of temperature, no pain, no chill.

Enlarged gland on outside of sternomastoid muscle about the size of an English walnut, hard, irregular, and freely movable. Postnasal space entirely shut off, mass about the size of a hen's egg extending from the soft palate down into the throat, tender to touch. X-ray report was abscess. Upon this report it was opened by a throat specialist about ten days before seen by the author, at which time he made an exploratory incision and introduced a curved hemostat laterally and downward, but no pus was obtained; bleeding was free, consistency soft, having the feeling of honeycomb. Diagnosis at operation, sarcoma; prognosis given as poor. Patient died July 18th. Laboratory report, spindle cell sarcoma.

J. M. Shefferd.

The Treatment of Cancer of the Lip by Radium—A Report of Twenty-four Cases.

JANEWAY, HENRY H.

J. Am. M. Ass., Chicago, 1918—LXX—1051.

The degree of success obtained in the treatment of operable cancer of the lip by radium in the series of cases reported and the maintenance to date with such regularity of the healed condition in earlier cases treated justifies a continuation of the use of radium in operable cancer of the lip. It may be that the lapse of time will require some modification of this judgment. This method of treatment includes the careful observation of the patients after treatment for the possible development of metastatic lymph nodes, and the operative removal of such when they occur, with the implantation of radium in

the wound. The treatment of cancer of the lip by radium should encourage earlier attention to this disease by the patient.

The application of radium emanation embedded in molds of the dental compound is recommended and filtered through the thinnest material for the most superficial lesions. As a matter of convenience we have used 0.5 millimeters of silver uniformly for all but the lesions with deep infiltration. While 0.5 millimeter of silver has been unnecessarily heavy for the most superficial lesions, it has given uniformly satisfactory results in our cases. For the deeper lesions, however, nothing has surpassed the progressive, smooth and complete retrogression produced by filtration through one millimeter of platinum. The tubes should be sunk five millimeters in the dental compound, and for the ordinary lesion the dose should be sixty millicurie hours per square centimeter, when the filtration is through 0.5 millimeter of silver, and one hundred millicurie hours per centimeter when through one millimeter of platinum.

The use of emanation instead of radium element facilitates uniform distribution over the lesion. Provision for uniform distribution is the most important factor in obtaining a successful result. It is true that it is possible to approach the uniform distribution obtained by emanation with the radium element, provided this is put up in many minute tubes; but few users of radium element find it practical to divide their radium thus, and the attempt to treat these lesions by merely placing on them single tubes of radium element is inaccurate and often inadequate.

The superior adaptability of radium emanation for the treatment of cancer makes the use of the element itself obsolete, and for the vast majority of cancers it is inefficient.

Emil Mayer.

Gonococcus Infection of the Mucous Membrane of the Oral Cavity.

MAYHEW, JOHN MILLS.

J. Am. M. Ass., Chicago, 1918—LXX—1223.

N., a student, aged nineteen years, had always been in good health. He denied venereal disease or recent exposure of any kind. January 2, 1918, he visited a dentist to have his

teeth cleaned. He reported that the dentist was so rough that his mouth bled in several places after the treatment. Within twenty-four hours he had a great deal of pain and a burning sensation in the buccal portion of the lips, and within forty-eight hours his throat was sore. Sixty hours after the treatment his lips were swollen and painful, and vesicles formed at the corners of the mouth. He could not swallow anything but the blandest of liquids, and even warm water hurt his throat severely. Five days from the time of infection he complained of intense pain in the throat and under the tongue; he could hardly move his lips in speaking, they were so swollen.

Examination was difficult, but inflammation of the entire buccal cavity was observed, hemorrhagic areas over the right pillars and velum and a white, clinging exudate over the left velum, cheeks, lower lip, dorsum of the tongue, and oropharynx. On the frenulum of the tongue there was a shallow ulcer with a red base resembling somewhat a mucous patch. The corners of the mouth were cracked and bleeding. The area under the exudate on the lips bled when the membrane was raised. The tongue was swollen and showed an exudate on the dorsal surface. The whole picture presented a most severe type of mouth infection. The submaxillary glands were swollen and tender; the cervical chains were negative. The temperature was 100.2° ; the pulse, 110. The patient felt and looked very ill. Serum from the ulcer on the frenulum was examined with the dark field illuminator, and by means of India ink smears for the spirocheta pallida, but none were found. Specimens were taken from different parts of the mouth and were examined, especially for Vincent's spirochete, the fusiform bacillus, and fungi. Smears made from the pus revealed gram negative, biscuit-shaped diplococci, both intracellular and extracellular. A large number were crowded in some of the leukocytes, one containing fourteen pairs. This organism grew slowly on ascitic fluid, hydrocele and blood serum-glycerin-glucose-agar, and did not grow on the simple cultural mediums at 37° C. It was agglutinated by serum from a known gonorrhreal blood. Complement fixation for gonorrhea was negative, but since this is usually the case in acute gonorrhea, not much value is put on this test.

The patient was sent to the hospital, isolated, and treated

with a mouth wash of a saturated solution of thymol. The mouth and throat were swabbed twice daily with a two per cent silver nitrate solution. The exudate increased rapidly, covering the roof of the mouth and the lips and evading the tonsils, but appearing on the pharynx by the morning of the following day, the eighth after infection. In forty-eight hours after treatment was instituted the exudate began to disappear, leaving a raw, bleeding surface, the roof of the mouth clearing first, then the pharynx and lip surfaces in order. The ulcer on the frenulum was the last to heal. At no time was there any odor from the mouth or the secretions expectorated. Smears were negative for the intracellular diplococcus on the twelfth day, and none of the organisms described were found in culture; but the mouth was very sore and, in places, raw, and it bled on slight provocation. The parotids were not painful at any period of the disease, the cervical lymphatics were but slightly tender, and the joints were never disturbed. The nasopharynx mucous membrane and nasal cavities were not infected.

Emil Mayer.

IV.—LARYNX, TRACHEA AND ESOPHAGUS.

Wounds of the Air Tract and Esophagus.

GLUCK, T.

Ztschr. f. arztl. Fortbild., Jen., 1915—XVI—391-426.

Good results have been obtained by primary suture for tracheal wounds in transverse cuts across the trachea. Eiselsberg recommends circular suture and tracheotomy at the same time. Furthermore, tracheotomy is to be undertaken in gunshot wounds of the larynx, and immediately if the hemorrhage is due to injury of the projecting tissues or cartilage. A deep tracheotomy is to be recommended in complicated wounds where there is much destruction of the soft parts of the cartilage.

The following methods are recommended for cases which cannot be relieved by simple dilatation or which show a marked destruction of the organ which cannot be repaired otherwise.

1. Tracheostomy and laryngostomy, with an artificial larynx scheme. A persistent assurance valve, which makes the wir-

ing of the canula unnecessary in high grade stenosing process of the upper air process, likely to cause danger from asphyxia. A median or elliptical excision is made, splitting the trachea or larynx with the external soft parts. The persistent fissure assures freedom from the dangers of bleeding. A prosthetic appliance, introduced in the form of an artificial larynx with inspiration valve, permits the patient to talk. In most of the cases the patient can speak without the prosthesis.

2. The laryngostomy can be combined with treatment of the lesion by dilatation. By means of the stoma that has been made; the entire scar tissue, which is visible in the opening of the larynx, may be removed and a partial or total laryngoplasty performed, a process which gives good functional end results.

3. Transverse resection of the trachea as far as the arytenoid region, laying the anterior wall of the esophagus bare, with conservation on the recurrent nerves.

4. Closure of deep esophagotracheal fistula by skin plastic.

5. Simple thyrotomy or total laryngofissure and partial or complete extenteration of the epiglottis, or resection of the portion of the cartilaginous framework, following up with total or partial laryngoplasty and formation of a permanent fissure.

6. Besides the partial resection of the trachea, total extirpation of the trachea and of the cricotracheal ligament to the bifurcation, combined with skin plastic.

Importance of Laryngostomy in Wounds of the Larynx.

FERRERI, G.

Riforma méd., Napoli, 1917—XXXIII—643.

Laryngotracheal wounds with more or less loss of substance or of the cartilaginous structure with residual fistulae, cicatricial stenosis, should be operated only after a certain time has passed and fever has subsided. We must distinguish between immediate intervention for removing splinters, foreign bodies, etc., and late operation, which aims at a permanent cure. In adults more than in children, large excision of the cricoid is indicated in order to obviate secondary stenosis. Before proceeding to a plastic operation the author introduces a rubber tube modeled for each individual, and after a long period

of tolerance leaves the laryngotracheal covering exposed to the air and light for a certain time. When the author is convinced that the tube does not undergo any modifications, he performs a plastic operation. He uses superimposed flaps, the skin of one of which is turned inward, the other lying on it. All cases have been successful by this method.

(1) **Further Reports on the Treatment of Malignant Disease of the Larynx.** (2) **Management and Statistics of Malignant**

Disease of the Upper Respiratory Tract.

Laryngoscope, St. Louis, 1918—XXVIII—131 and 135.

(1) Beck contributes a paper upon this subject and prefacing the statement to his report that in 1916 there was as yet no specific treatment or cure for this terrible affliction and that surgical treatment gave the only chance, if done thoroughly and immediately after an early diagnosis. Methods other than surgical were described, such as diathermia, deep penetration of the Roentgen ray, and the Percy coagulation treatment. He stated at that time that Roentgen rays, aided by diathermia, caused marked changes and often disappearance of the growth, which later would recur and terminate fatally; with radium in the dosage of ten milligrams pure there was no appreciable change, but that the Percy coagulation method promised more than Roentgen rays or radium.

Since laryngectomy is associated with considerable risk to the patient's life from complications, such as shock, pneumonia and mediastinitis, Beck has developed the technic of laryngeal fissure and removal of the neoplasm according to the Percy coagulation method. He has employed it for carcinomata and sarcomata of the nose, carcinomata of the jaw, thyroid gland, external ear and larynx—in all, twenty-three cases.

The method was used in four cases of carcinomata of the larynx, and the reasons given for substituting a laryngectomy and removal of the growth by the Percy method for a laryngectomy are: (1) The patient will consent more readily to an operation when he may be promised that he may have a voice, even though it will not be normal. (2) He may even hope to have a normal breathing tube and not have to wear a

permanent tracheotomy tube. (3) The operation is not as dangerous as a laryngectomy.

(2) In the management and statistics of malignant disease of the upper respiratory tract he has complete reports, including the follow-up system in the majority of one hundred and forty-three cases observed and treated since 1895. The sarcomata included the external nose, intranasal including the sinuses, nasopharyngeal, tonsillopharyngeal, alveolarpalato, mandibular, lingual, pharyngeal; in all, forty-one cases with eleven deaths.

The carcinomata included external nose, intranasal including the accessory sinuses, alveolarpalato, pharyngeal, lingual, and laryngeal; in all, one hundred and two cases, of which seventy-three were followed up to recent date. Twenty-one are still alive and fifty-two died.

In the management of malignant conditions other than the above, Beck further says that there appears to be nothing gained by surgery. Deep X-ray, massive doses of radium, high voltage of diathermia, Finsen rays and salvarsan all have some influence.

Circular Resection and Suture of the Trachea and Plastic Reconstruction of Large Defects of the Trachea.

CHIARI, O.

Monatschr. f. Ohrenh., etc., Berl. u. Wien, 1915—XLIX—
337-338.

Chiari advocates circular resection and suture of the trachea when portions of the trachea and larynx are completely lost through wounds. Care must be taken to avoid injuring the recurrent nerves. The posterior portion of the trachea is sutured with catgut from within outward, while the anterior wall of the trachea is sutured from without with silk. The soft parts and the skin are sutured successively, leaving a small opening for drainage.

If the tracheal defect is so large that the lower stump cannot be moved sufficiently to permit the tracheal margins to be brought together, Gluck's plastic operation must be performed.

Contribution to the Study of War Wounds of the Larynx and Trachea.**RAMONET.**

Thése de Lyon, 1917.

Ramonet divides the lesions of the larynx into two groups:

1. Inflammatory and stenotic lesions.
2. Traumatic and nervous lesions.

1. The inflammatory and stenotic lesions include the following four groups: (a) Laryngitis with infiltration more or less marked; (b) adhesions, cicatrices, loss of substance, and fractures; (c) foreign bodies; (d) laryngostenosis.

2. The nervous traumatic lesions comprise: (a) Nervous aphonia without apparent disturbance of the motility of the cords; (b) laryngeal neurosis; (c) simple recurrent paralysis; (d) associated laryngeal paralyses.

Direct Laryngoscopy in the Treatment of Chronic Postdiphtheritic Laryngotracheal Stenosis.

LYNAH, HENRY LOWNDES.

N. York State J. M., 1918—XVIII—170.

The different types of chronic postdiphtheritic laryngotracheal stenosis should be classified as follows: 1. Neurotic. 2. Spasmodic. 3. Traumatic. 4. Pathologic.

The traumatic types are: (a) Intubational. (b) Tracheotomic. (c) Operative.

The whole of the pathology of postdiphtheritic laryngotracheal stenosis is laid down in the beginning with the acute diphtheritic process. Diphtheria is a dissecting necrotic disease, and upon the duration of the disease and the degree of involvement of the larynx and trachea depend the subsequent changes which occur in these localities. The writer has collected ten cases of laryngeal diphtheria which responded so readily to antitoxin that intubation was never performed. All of these cases became dyspneic from seven to ten days after the primary diphtheritic process had subsided, and all of them required intubation to relieve the stenosis. Some of them were thought to be reinfected by diphtheria, but direct

laryngeal views revealed the ever present subglottic edema. This only goes to prove that upon the degree and duration of the diphtheritic process depends the amount of infiltrative involvement of the laryngeal structures. Nevertheless, the writer feels that while the inevitable nature of the pathologic process plays a very important part in all cases, at the same time traumatism and injury by instrumental means for the relief of the stenosis also add largely as a contributing factor. The writer has classified the pathologic lesions as supraglottic, those above the cords, and infraglottic, to the changes which occur below the cords.

The following pathologic lesions are usually present in the great majority of cases with retained intubational tubes or tracheal canula. (a) Edema. (b) Polypoid masses. (c) Decubitus ulcers; intubational or canula. (d) Paralysis (crico-arytenoid fixation). (e) Perichondritis. (f) Chondritis. (g) Metaplasia. (h) Endochondral bone formation.

Emil Mayer.

Intratracheal Anesthetic Machine.

ADSON, A. W., AND LITTLE, G. G.

J. Am. Med. Ass., Chicago, 1918—LXX—1746.

The one herein described has been constructed to conform to three principles, as follows:

1. Constant Flow of Air.—A constant flow of air maintained and controlled so that pure air alone, or any degree of ether saturation may be given. This is accomplished by diverting the air current through the valve. If pure air is desired the valve is thrown open to send the air direct without entering the ether chamber. If ether is desired, part of the air current is forced through a tube on the ether surface, where it becomes saturated with ether and escapes through a tube.

2. Ether Tension.—Ether tension is kept constant by the lowering or raising of tubes.

3. Constant Air Pressure.—A safety valve prevents too great pressure within the lungs. This is accomplished by connecting the air current with a mercury manometer.

Emil Mayer.

Transplantation of the Trachea.

BURKET, WALTER C.

Johns Hopkins Hosp. Bull., Baltimore, 1918—XXIX—35.

The author had in view the possible utilization of a tracheal transplant in human cases in which a portion of the trachea had been resected on account of malignant disease. The transplantation of the trachea was done upon dogs. An important factor in the success of the tracheal transplants was the determination of the sterility of the trachea at different levels.

The literature is reviewed, showing that extension work had been done on the healing of tracheal wounds after resection, and the use of various grafts for closing tracheal defects. By far the greater portion of the study had been applied to the treatment of tracheal fistula, by using various material for transplantation. The author divides his experiments into two classes. The main division consisted in the auto- and iso-transplantation of complete annular segments of the trachea in dogs, and a subordinate division, the determination of the sterility at different levels of the trachea of the cat. The experiment relative to the studies with cultures shows the trachea practically in all cases sterile from the larynx to the hilus of the lung. The following experiment in the autotransplantation of the trachea in dogs was made: The animal was etherized by mouth or through a tracheotomy wound. A middle incision was made from the larynx to the suprasternal notch and the muscles separated down to the pretracheal fascia. This fascia contains numerous blood vessels which partly supply the intercartilaginous portion of the trachea. These vessels were ligated and divided only over that portion of the trachea which was to be transplanted. A second important blood supply of the trachea is furnished by a vessel upon either side of the trachea and parallel with it; this was ligated at the point where the trachea was to be divided in order to preserve the circulation of the trachea to the very line of incision. A segment of the trachea composed of from three to nine cartilaginous rings in length was completely separated by a transverse incision and removed. This

autotransplant was then replaced and sutured end to end by using three interrupted black silk sutures placed equidistantly, which picked up the perichondrium and cartilage without penetrating the entire tracheal wall. One short continuous black silk suture was placed in the fibroelastic posterior wall of the trachea. Both ends of the transplant were sutured in the same way.

The operative technic in the cases of the isotracheal transplants was similar to that of the autotransplants. Both animals were operated upon at the same time and the tracheal transplants were interchanged. The tracheal segments from the different sized animals were readily adapted in size to one another because of the anatomic fact that the cartilaginous portion of the tracheal rings was not complete and the posterior wall was formed of fibroelastic tissue. The recovery of the animals from the anesthesia and operation was prompt. The skin wound healed per primam, but after from one to three weeks they developed marked symptoms of tracheal obstruction with dyspnea and died. Autopsy revealed a normal esophagus and lungs and a stricture of the trachea at the site of the transplant. The cases of isotracheal transplants resulted in death, with symptoms similar to the unsuccessful cases of autotransplants, and autopsy showed normal lungs with stricture of the trachea at the region of the transplant.

Microscopic studies of sections made through the anterior and posterior walls of the strictures showed it to consist of a mass of granulation tissue, in the deeper layers of which there were pieces of poorly staining cartilage that were in the process of destruction. The mucous lining was usually absent and the normal relationship of the tracheal layers was destroyed. The successful transplants (three in number) showed no symptoms and gave every evidence that they were as healthy and normal as before operation. Upon exposing the trachea it was found normally mobile, without adhesions, and one could make out by gross examination no reaction in the tissues or structures about the site of the transplant. The life of these perfect transplants—that is, from the date of operation until the animal was sacrificed—was sixty-two, fifty-four and thirty-six days, and the segment transplanted was composed of three, four and seven cartilaginous rings.

Histologically the tissues of the transplant appeared so normal that it was difficult to locate the point of anastomosis, which anastomosis was formed by the tissues of the different layers themselves and not by connective tissue. Epithelium was present everywhere. Scarring was absent, as well as infiltration with lime salts. The cartilage of the transplant stained the same and resembled that of the untransplanted portion of the trachea. The author is of the opinion that the strictures of the trachea that resulted in the unsuccessful case was probably due to the low grade infection and was not sufficiently virulent to cause the skin wound to break down or to infect the lung and that isotracheal transplants resulted in stenosis. In all, ten dogs were operated with three successful results.

Cancer of the Esophagus Developing on a Scar.

DROUIN AND CANUYT.

Rev. de laryngol., etc., Paris, 1917—XXXVIII—218.

Cancer of the esophagus being relatively common, the authors apologize for the publication of this case, but call attention to certain unusual features.

The patient, a man of forty-eight years, one year previously had swallowed some caustic potash by mistake for white wine. At the time of admission he complained of difficulty in swallowing. A sound of large caliber was arrested at thirty centimeters. Esophagoscopy later showed a stenosis at twenty-five centimeters depth, the opening being slightly fungous. Sounds up to thirty-three millimeters were passed, and the stenosis was regarded as purely cicatricial. Two months after this the patient returned because of greatly increased difficulty in swallowing. This time esophagoscopy showed a stenosis, through which a sound was passed, but the patient still could not swallow. Gastrostomy was done. Four days afterward the patient had several violent attacks of coughing and dyspnea, and died suddenly of a profuse hemorrhage. Postmortem the cancer was found to have perforated the left bronchus, also the arch of the aorta, hemorrhage from the latter having caused death. This double perforation is unique. Other odd features are the absence of dyspnea until

late in the disease, the passage of the esophagoscope and large sounds without accident, and absence of symptoms from pressure on the recurrent laryngeal or pneumogastric. As to proving the development of the cancer on the scar left by the caustic, the writers admit difficulty, but naively quote Pierre Delbet's remark that "cancer loves scars." A. Miller.

Stammering.

Med. Rec., New York, 1918—XCIII—800.

PACINI, AUGUST J. P.

The treatment may be divided into three steps:

1. Determine the status of the central nervous system for the purpose of finding a more perfect sense to replace the defective one of the stammerer.
2. Determine the mental type responsible for the stammering defect according to the psychophysic examination suggested.
3. Reeducate the stammerer in a new mental imagery, using any well established reeducation system.

This same routine is brilliantly successful in the prophylaxis of stammering. To this end, it should be carried out in the case of prodromal stammerers, which procedure would result in the abortion of the defect among school children.

Emil Mayer.

Two Cases of Thyrotomy.

BRINDEL.

Rev. de laryngol., etc., Paris, 1918—XXXIX—36.

The advantages are obvious of the simplifying of the operation of thyrotomy by local anesthesia, abandoning of the preliminary, concomitant and often subsequent tracheotomy, the immediate application of the suture to the vocal organ. The intervention is more rapid, and its results are free from respiratory complications. There is even no need, although some operators still advise it, of suturing the plates of the thyroid in transfixing them. There is the risk of cracking them, especially when they are ossified, as is unhappily the case often in adults. It is sufficient to approximate the edges

of them and to fix them in good position, suturing with a fine needle the soft parts which cover the cartilage. Care should be taken to denude the cartilage only at the median line so as to allow the shears to pass, thus minimizing the danger several days later of the installation of a perichondritis on the edges of the cartilage incision and preventing an extension to the thyroidal plate being made, which retards the cure.

If a block is put under the shoulders of the patient, the head being thus in the half raised position of Rose, it is easy to prevent the blood from flowing into the trachea the moment when the interlaryngeal maneuvers are executed. By taking these precautions the author has been successful with two thyrotomies that he has made in two very dissimilar cases: in the first, the extraction of a piece of shrapnel incrusted in the internal face of the thyroidal cartilage; in the second, the extraction of an epitheliomatous tumor occupying the entire right vocal cord with the exclusion of the arytenoidal region.

1. Thyrotomy for Projectiles.—A wounded man came into the service in August, 1915, with a projectile, a round piece of shrapnel, that the X-ray located in the laryngeal region. The projectile entered through the posterior part of the thorax, on the right side. It transversed the internal edge of the lung, the mediastinum from below upwards, without injuring any important organ, and then it lodged under the left plate of the thyroid without fracture and under the anterior part of the vocal cord.

Laryngeal examination was impossible because of the intolerance of the patient, whose voice, slightly hoarse, did not indicate the presence of the foreign body in the interior of the vocal organ. The localization by the X-ray was very poorly established.

Before the patient had entered the author's service, a first tentative examination had been made by a surgeon who had looked for the foreign body in the carotid region without encountering it.

The author made a second fruitless search for the shell fragment outside of the larynx, deceived partly by the X-ray, and partly by the sensation of a little rounded tumor on the external surface of the thyroid, on palpation at a point corresponding apparently to the place indicated by the X-ray.

In the presence of this rebuff, the author examined the larynx. After several attempts and aided by a good cocaineization, a rounded projection was discovered with the laryngoscope, situated at the left side of the larynx near the median line, under the anterior part of the vocal cord. This seemed to be the foreign body, and we decided upon a thyrotomy. Upon opening the thyroid a small metallic surface was observed. The mucous membrane was incised and the ball laid bare; its extraction was simple. Three weeks after the operation the patient, who had had a slight subcutaneous emphysema, but no general symptoms, was completely cured.

2. Thyrotomy for Epithelioma.—A man came from the front with the diagnosis of chronic laryngitis, which was thought due to service. He really had a tumor occupying the length of the right vocal cord, with the exception of the arytenoid. The cord was immovable. There seemed to be no perichondritis.

A thyrotomy was performed with excellent results. For a few days the size of the larynx seemed increased; weeks after the operation everything was in order.

The rapidity of the evolution of the neoplasm gives little hope as to the outcome of any intervention. If there is a recurrence which is produced in fifteen days, it indicates a very great malignity of the neoplasm, although the microscope shows its epitheliomatous nature.

Aphonia of War; Treatment by Reeducation.

LIEBAULT AND CROISSARD.

Rev. de laryngol., etc., Paris—1917—XXXVIII—29.

Four causes of aphonia in war time are recognized: (1) Wounds of the larynx or its nerves; (2) laryngitis—tuberculous, grippal, simple, chronic; (3) mild hypertrophic laryngitis resulting from functional aphonia and due to efforts at phonation; (4) purely nervous aphonia due to shock. The paper deals exhaustively with the two latter classes only. Of prime importance is the fact that there is a constant inverse ratio between the degree of functional aphonia and the fullness of respiration. Accordingly, the patient is carefully examined by inspection, mensuration, the spirometer and the

fluoroscope to determine the character and volume of his respiration. Respiratory reeducation is promoted by gymnastic exercise of the arms, chest and diaphragm. In his efforts to phonate, the patient contracts the muscles of the pharynx, elevating his larynx and approximating the ventricular bands so that sound is produced by their vibration—a pharyngeal instead of a laryngeal voice. Hence, the ventricular bands become irritated and hypertrophic. To correct this the patient is encouraged to repeat over and over those sounds and words which approximate his normal voice; he is required to flex his head toward his chest and the larynx is held down by the thumb and index finger; drills are given in sounding certain vowels (o, e, a, u, i) and consonants (k), using only the first part of the expiration; the larynx is massaged. Most nervous aphonics have no trouble with the muscles of the cheeks, lips and tongue, but when these are paretic they may complicate the aphonia, and systematic exercises are given to overcome such deficiencies. In summarizing, the fundamental necessity of correcting the manner of breathing is reemphasized. The authors have found nearly all cases amenable to treatment, and the earlier it is instituted the better. A. Miller.

V.—MISCELLANEOUS.

Warfare Injuries and Neurosis.

MILLIGAN, SIR W.

Proc. Roy. Soc. Med., Lond., 1915—Laryngol. Sec., VIII—109.

In injuries of the nose and nasopharynx the immediate anxiety has often been the arrest of hemorrhage and the remote how best to restore function and appearance. For hemorrhage about all that can be done is to plug up from the front.

In comminuted injuries of the framework of the nose the maintenance of a free passage and the prevention of adhesions has presented difficulties. As an effective splint, the finger of a rubber glove packed with gauze may be used.

Injuries of the larynx are rare. In one case perichondritis

occurred requiring tracheotomy. Warfare neurosis is very common.

The writer reports case of left recurrent paralysis from bullet wound of face, the bullet being imbedded in the body of the second vertebra. The fibers of the vagus which go to form the recurrent were doubtless injured.

Another case, bullet entering just below and behind the lobule of the ear, traversed the skull and right eye. The cribriform area was so badly damaged that complete anosmia resulted.

Nine or ten cases of deafmutism from shell shock all recoverer in six weeks. Abrogation of function was due to temporary suspension of neuron impulses from the higher cortical centers to the periphery.

Many of the ear neuroses occurred in those previously affected with ear disease, which might make one believe that they are due to peripheral rather than central disturbances.

War Wounds in the Domain of Otorhinolaryngology.

GUYOT.

Cor. Bl. f. schweiz. aerzte., Basel—1916—1179.

These observations were made in the military hospital at Lyon.

Wounds of the Nose.—These may be of great variety, from the abrasions at the end of the nose to the complete destruction of the bony skeleton of the nose. The injury varies, almost never resulting in severe infectious manifestations. The wound heals after proper care with drainage. The only result is a larger or smaller deformity, which is fixed by grafts. Projectiles are sometimes very difficult to extract, particularly small pieces of shell in the bone.

Wounds of the Sinus.—These are common, but those of the frontal being often fatal. Sometimes a projectile enters through one of the cheeks, through the sinus maxillaris, nasal fossa, and out of the maxillary and cheek on the other side. The presence of the maxillary wound does not necessarily signify a maxillary sinusitis, though it is rare that the sinus that is

traversed does not suppurate. Localization is easy. The projectile in the sinus should be removed according to the Caldwell-Luc method in all cases of sinusitis with projectiles, which are not cured with lavages, at the end of a month or two.

Wounds of the Larynx.—These are not very frequent, for most of them are fatal. The author observed one in which the trachea was opened by a bullet. Treatment consisted of drainage with paraffinated gauze, cauterization of the granulations in order to prevent stenosis of the trachea, and later dilatation.

Wounds of the Auditory Apparatus and War Deafness.—These are most interesting lesions, particularly those of war deafness. They may be divided into two classes, deafness by direct or indirect traumatism.

1. Deafness by direct traumatism may be produced by penetration of the projectile or by shock upon the petrous bone. When the wound is cured we must look after the auditory function in order to save what we can. It is necessary to operate when mastoiditis, which is always suppurative, is present. The bony fragments, and if there is a projectile, must be removed, or if a patient presents one of the complications, severe paralysis, labyrinth injury and signs of meningitis, the operation is imperative. In case of a fracture of the bone, the patient should be put to bed and kept quiet as long as possible, if there is no symptom requiring operation. When there is no fracture of the petrous bone, we have to do with the labyrinth concussion, whose symptoms are classical.

2. Deafness by Indirect Traumatism.—This is the true deafness of war. The violent displacement from the explosion of gas, the so-called "wind of the shell," is what causes loss of audition. The drum is violently injured by the gas produced by the explosion of a shell near by. It is torn by the column of compressed air. Two mechanisms result, either the tympanum is ruptured by the shock or it resists. If the tympanum is ruptured, there will be hemorrhages and suppuration of the tympanic cavity, especially if the ambulance physician has used lavage. If the tympanum resists, then all the air pressure is transmitted to the internal ear and produces a labyrinth concussion; most often the soldier loses con-

sciousness, and when he revives is dizzy, shaking, vomits and has violent tinnitus. At the same time he is completely deaf on one side and most often on both sides. He has true symptoms of Ménieré's disease, traumatic and acute. In most cases the vertigo disappears, then the tinnitus, and, at the end of some weeks, the deafness. The prognosis is less grave than was thought at the beginning. Disturbances of equilibrium disappear first, then the tinnitus, then the deafness. The statistics of Prof. Lannois show that five per cent are deaf. The final class is most interesting. It is the deafness of deafmutes from traumatic neurosis. They recover entirely, if the patient is placed in the hands of a specialist. Deafness may be combined with aphonia, blindness and other nervous symptoms.

SOCIETY PROCEEDINGS.

NEW YORK ACADEMY OF MEDICINE, SECTION ON OTOTOLOGY.

Meeting of March 8, 1918.

Case Showing Result of Radical Operation Treated by the Carrel-Dakin Method.

BY JOHN R. PAGE, M. D.

This patient has had a double radical operation performed. Dr. Scruton operated upon the left ear two years ago, and the result was so good the patient was anxious to have the other ear operated on. He had a fair amount of hearing, but a considerable discharge from the right ear, and Dr. Scruton advised against operation, as there was a large perforation and good drainage. With this advice Dr. Page coincided. Nevertheless, the man came back repeatedly and insisted upon having a second operation, saying that he would assume all the responsibility in the matter.

He was operated upon on the first of October, 1917, and was discharged cured at the end of six weeks. The dermatization was very rapid, owing to the fact that a cholesteatomatous membrane covered the inner tympanic wall and dipped into its recesses. The usual incision was made and brought down like an interrogation mark. At the end of the operation it was closed throughout, and a tube was put through the meatus into the cavity, gauze being placed loosely around the tube to hold it in place, and the auricle and skin protected with vaselin gauze. Then from three drams to one-half ounce of

Dakin's solution was injected through this tube every two hours for 48 hours. Bacterial counts were ordered but the orders were not satisfactorily carried out, as the facilities for doing it properly were lacking. The cavity, however, looked very clean, so after forty-eight hours it was filled with chloramin paste, which is soluble in water. This was syringed out every day with Dakin's solution and renewed. The tympanum was dermatized in ten days, but the posterior cavity required six weeks for complete dermatization.

The man's hearing was extremely good for about two months, and he was very happy over the results. Then he came back one day saying his hearing was not so good. Examination of the ear showed no reason for any impairment of the hearing, but closer inspection showed a tiny crust on the floor of the hypotympanic space. This was removed with a swab, revealing a little secretion. Immediately he declared that he heard perfectly, and went home satisfied. This happened four or five times. About a week ago he returned, saying that he was very deaf. This examination showed a little granulation on the floor between the promontory and the facial ridge in the hypotympanic space. This was rubbed with nitrate of silver, and he left the office saying that he heard very well, but says now that he has not heard so well since. There is evidently some interference in that locality, but it is difficult to explain.

Dr. Page said that he had treated only three radical with chloramin paste in the cavity, and only one or two cases of simple mastoids, but with the latter it got so mushy that it was evident the cavity was not sufficiently sterile when it was used. Carrel says that if a wound has been thoroughly cleansed and the bacterial count is found to be very low, the chloramin paste will keep it clean for twenty-four hours. Evidently in the simple mastoid cases in which Dr. Page tried this paste the wounds were not clean, for there was a great deal of secretion at the end of the twenty-four hours, so they were washed out with Dakin's solution, using simple gauze drainage.

The theory on which the chloramin paste is used in connection with the Dakin's solution is that after the wound has

been rendered practically free from bacteria by the Dakin's solution the one per cent of chloramin, being in a paste that is soluble in water, comes in contact with the surface of the wound and dissolves away as it is used up, and allows the fresh, undissolved paste to keep in contact with the tissues, thus the action of the chloramin is prolonged and the wounds are kept clean.

A second case was presented to show the action of the Dakin's solution on what had been an unusually dirty mastoid wound. This patient was operated upon three weeks ago to-morrow. The rubber tube was put into the wound at the time of the operation, part of the wound being left open with a piece of gauze. When the Dakin's solution was instilled the patient was directed to lie on the opposite side, with the head low, and when the wound was filled with the fluid it came out at a point which showed the cavity to be completely filled. The wound was filled with the solution every hour for the first twenty-four or forty-eight hours; after this the wound was allowed to close together with a little drainage. The patient was not seen by Dr. Page for two weeks. It was then found to be badly infected, and when the bandage was taken off pus poured out of the lower part of the wound, which was wide open. The house surgeon had been syringing it out every day with Dakin's solution, but apparently without any effect. Dr. Page directed that the patient be put back to bed and the tube reinserted, and the Dakin's solution instilled every hour for three or four days, after which the surgeons reported that it was clean. The dressing and the tube were taken out and a little drain put in the bottom of the wound. Next day this was removed, and the next day the wound was found to have no secretion whatever and to be closed except a small opening where the tube had been. The point where the tube was has not closed entirely, but there is no secretion, and the wound has almost healed.

Dr. Page said that when he found the wound so dirty, he made smears, which were examined in the laboratory and reported that it was loaded with bacteria. A bacterial count was made on the day the tube was removed, and there were no bacteria. The canal has always been dry.

**Case Showing Result of Radical Operation Subsequently
Treated With Dakin Solution.**

BY PHILIP D. KERRISON, M. D.

DISCUSSION.

DR. PAGE said that the ideal method would be to fill the cavity with Dakin's solution for fifteen or twenty minutes every hour or two, as Dr. Kerrison has described, for experiments have shown that after about fifteen minutes' contact with the wound the solution becomes so decomposed by the chemical action on the tissues it is of no more use. With a private patient and a special nurse, that method can be carried out, but under war conditions he thought it would be found that the tube met the conditions more satisfactorily. It was also found advisable to protect the skin with the vaselin, for in some instances he had seen a dermatitis extending down the neck which lasted for several weeks. It might even leave a permanent mark.

Dr. Page said that experiments with the Dakin's solution have shown that it more nearly approaches the ideal antiseptic than anything yet discovered. Carrel says it is the best thing that he has been able to reach so far, in that it does not interfere but very slightly with tissue repair, and practically does not interfere with the formation of healthy granulations, and he makes the statement that infection is the cause of exuberant granulation tissue which is an evidence of the presence of bacteria in a wound.

He would bring the patient back next month, and he was quite certain that she would not have a hollow space. She might have more of a depression than she had then, as the soft parts would probably contract down to the bone, and in the process of repair a network of trabeculae would form between the bone and the tissue and later contract. It would doubtless bridge over and show such a result as is seen in a healing mastoid. In all of these recent wounds one can press on the spot and find a cavity for a considerable period of time. The point brought up by Dr. Richards was an interesting one, but his idea that tissue repair is arrested is just what Dr. Carrel claims that Dakin's solution does not do.

DR. BLACKWELL asked whether lumbar puncture had been made ten years ago when the patient had meningitis.

DR. KERRISON said that the question had been brought up at the time, and lumbar puncture was decided against as not essential to a diagnosis. The patient was unconscious or delirious, had rigidity of the neck and contracted pupils, and the diagnosis seemed clear. The views on lumbar puncture were different ten years ago from now. The exposure of the dura was just what one would make in exploring for a supposed abscess. Three vertical incisions an inch apart were made over the cortex, and a grooved director inserted through the posterior incision and carried into the lateral ventricle.

DR. BLACKWELL said that that was the point he wished to bring out.

DR. KERRISON said that there was a difference in the use of the Dakin's fluid in a wound resulting from a simple mastoidectomy and in the wounds usually treated by the Carrel method. Most of the war wounds are deep wounds in the muscles or soft tissues, and when Carrel said that the Dakin fluid does not interfere with repair he meant the repair of normal muscle tissue; but in a mastoid wound granulations must form to fill up the surgical cavity resulting from the operation; and it is a question whether the Dakin's fluid will not inhibit this necessary process of repair.

Labyrinthitis Complicated by Meningitis of Doubtful Origin.

BY T. LAURENCE SAUNDERS, M. D.

The author is indebted to Dr. Cornelius G. Coakley for permission to report this case.

The patient, Fred M., a schoolboy, was admitted to one of the medical wards at Bellevue Hospital on June 8, 1917, complaining of headache and pain down the back of his neck. His past history was not of interest excepting that he was supposed to have had an abscess in the left ear when a baby.

Three weeks before admission, after a trip to Coney Island and a ride on a jolting machine, he felt very dizzy. This dizziness continued during the rest of the day and evening and was accompanied by nausea and vomiting. The patient complained of a severe pain in the left ear and felt feverish. Two

days later the ear started to discharge, and the pain in the ear and the discharge continued up to the time of admission. The pain was of sufficient severity to keep him awake at night.

Physical examination on admission to the hospital showed him to be a frail looking boy of fourteen years, with face flushed and complaining of headache. The pupils reacted to light, but the reaction was not well sustained. There was no ocular palsy. The left ear showed a profuse foul discharge welling through a perforation in the drum; sagging of the posterior canal wall; slight tenderness over the mastoid tip. Right ear, negative. Apparently tenderness along jugular vein; lymph nodes on left side of neck slightly enlarged and tender. The remainder of the examination was unimportant, save that there was a slight Koenig's on the left side. Temperature, 101; pulse, 72; respirations, 16.

White blood count, 22,000; polynuclears, 90 per cent. Blood cultures sterile on June 10th.

He was transferred to the otologic and laryngologic division. Otologic examination at that time disclosed a chronic suppurating ear on the left side with a dead labyrinth.

Second Operation, June 21.—Spinal tap; cloudy fluid; slight pressure; cell count, 410. Globulin test does not reduce Fehling's.

On June 14th a radical operation was performed by the author, and a cholesteatomatous mass was found in the middle ear and antrum. There was a fistula in the external semicircular canal. The external semicircular canal was uncapped and the vestibule opened posteriorly through the hard angle. Cholesteatoma was found in the vestibule. The bridge of bone was removed beneath the oval and round windows, and also the promontory was uncapped. At this point the patient's general condition made it necessary to stop the operation before the cerebral and cerebellar dura was exposed. After the operation the patient's condition seemed to improve, the headache and pain in the back lessening. However, this was but temporary, and on June 20th he had a slight chill with rise in temperature and increase of headache. The headache and tenderness in the muscles of the neck became more marked. On June 22d the second operation was performed; the original

wound was reopened, and a large area of bone removed over the cerebral and cerebellar areas; dura congested, no abscess found. A spinal tap taken at the first operation showed a cloudy fluid under pressure, 410 cells per cubic millimeter; globulin present; Fehling's not reduced.

The second operation effected an improvement which, however, was but temporary. On June 24th the pain in the head and neck were severe, the reflexes were exaggerated; ankle clonus was present, and the patient vomited twice without nausea.

On June 28th spinal puncture was again performed; fifteen cubic centimeters of spinal fluid were drawn, and eight cubic centimeters of automeningococcus injected. From that time on the patient made a steady recovery. The wound healed finally, and the patient now has a dry though deaf ear.

The case is presented for the purpose of emphasizing the question of treatment. Is it not better in certain borderline cases of meningitis to resort to the removal of large areas of bone around the original focus, together with frequent spinal taps and the possible use of automeningococcus serum, rather than to incise the dura at the time of operation?

DR. ALFRED BRAUN did not think that Dr. Saunders was justified in making a diagnosis of meningitis in his case, as there were no bacteria found in the spinal fluid. He had a case of abscess in the temporosphenoidal lobe of the brain, in which the spinal fluid was so turbid that after standing for an hour in a test tube the sediment filled almost half the tube. The fluid was sterile, and the patient recovered promptly after drainage of the abscess. The cause of the meningeal symptoms in Dr. Saunders' case was doubtful. Dr. Braun did not see how a real meningitis could be cured by simply exposing the dura.

The type of labyrinth operation which should be performed depends upon the condition which is present. In this case there was a dead labyrinth, with meningeal symptoms, and therefore a labyrinth operation of the type of the Neumann operation should have been done. The vestibule should have been opened by removing the posterior surface of the petrous pyramid, as far as the internal auditory canal, thus exposing

the dura of the posterior fossa, in order to thoroughly investigate this region.

DR. DANZIGER agreed with Dr. Braun that one cannot call a case true meningitis unless the bacteria are found in the spinal fluid, and cited a case of removal of polypi from the middle ear, which was admitted into the hospital three days later with all the symptoms of meningitis. A spinal puncture showed cloudy fluid which was sterile. The patient was in such poor condition that it was not thought advisable to operate, but repeated lumbar puncture was made and he recovered. After that a radical mastoid was performed, and the man disappeared from observation; but returned three months later, having developed a meningitis, and the bacteria *Proteus* was found in the fluid. Very likely the first time he had some toxic condition, and then developed a true meningitis.

DR. KERRISON said he did not see the logic of the discussion. Apparently the question at issue was mainly as to a choice of terms. It would seem from the discussion that some of the speakers regarded the finding of a microorganism in the spinal fluid as essential to a diagnosis. That is not the opinion held by the Board of Health of New York City. Some of their staff have recently published the records in a large series of cases which they classify largely according to cytologic and chemical changes in the spinal fluid. In other words, they do not regard the finding of a microorganism as necessarily essential to a diagnosis of meningitis, though the demonstration of its presence would make the diagnosis more exact and complete.

DR. BRAUN did not think that it was simply a question of difference in name. If you have a real meningitis with bacteria in the spinal fluid, the patient will probably die. In cases where there are meningeal symptoms without bacteria in the cerebrospinal fluid, the patient is very apt to recover.

DR. SAUNDERS said that while he did not agree with Dr. Braun and Dr. Richards that only those cases in which germs are found in the spinal fluid should be called meningitis, it really made little difference in these cases whether they were called serous meningitis, meningismis, or meningitis, the pathologic condition was the same. The case was presented to

raise the question of treatment in certain of these symptoms, and if it would make these gentlemen any happier he would be glad to change the title of his paper to "Labyrinthitis Complicated by Meningeal Symptoms of Doubtful Origin."

Case of Abducens Paralysis Complicating Suppurative Meningitis.

BY PHILIP D. KERRISON, M. D.

DISCUSSION.

DR. BLACKWELL told of a case of abducens paralysis which had been operated upon twice for mastoiditis, he doing the second operation. Subsequently the patient developed an infection of the internal ear and died of meningitis.

Paper: Report of a Case of Granuloma of the Mastoid Simulating Subperiosteal Abscess.*

BY JOHN D. RICHARDS, M. D.

*See page 487.

NEW YORK ACADEMY OF MEDICINE,
SECTION ON OTOTOLOGY.

Meeting of April 12, 1918.

**Chronic Suppuration in Middle and Internal Ear; Radical Mastoid
Operation and Labyrinthectomy.**

BY JOHN McCoy, M. D.

Frank M., age twenty-one years, was first seen January 16, 1918. He stated that he had had deficient hearing for the past five or six years, and had had several attacks of dizziness during the past year.

On examination, both ears showed pus in the external canals. In the left ear, the drum was destroyed except for a thickened margin, and a few drops of pus were seen in the middle ear cavity. In the right ear the drum was destroyed, and the middle ear contained granulations and foul smelling pus.

The ear tests showed the following: The voice was heard in the left ear at fifteen feet; in the right ear it could not be heard. The Weber was referred to the left ear. There was no spontaneous nystagmus. After turning to the left there was no after-nystagmus; on turning to the right, there was after-nystagmus for twenty-one seconds. The caloric test produced no reaction in the right ear; a good reaction in the left ear. The fistula test produced a slight nystagmus from the right ear; no reaction from the left ear. The pointing test was normal for both the right and the left side. The pointing reaction after rotation was normal for both sides.

Diagnosis: Chronic suppuration in the right middle ear and mastoid; also chronic diffuse suppurative labyrinthitis.

On January 24th a radical mastoid operation was performed in the right ear, throwing the mastoid and middle ear cavities into one. It was then seen that a large fistulous opening eroded almost the entire outer wall of the external semicircular canal and that this opening contained granulations and foul smelling pus. Accordingly, it was decided to extirpate the internal ear. The vestibule was entered by chiseling down through the solid angle, and the various canals were then exposed. The vestibule contained granulations. After this, the promontory was taken down from the oval window to its anterior border. No actual pus, but a turbid serum, was found here, so it was decided not to further remove the cochlear whorls. The wound was packed and the radical cavity dressed in the usual manner, except that a slight opening was left in the mastoid incision for more adequate drainage. This was allowed to heal subsequently by granulation.

The patient (shown tonight) made an uninterrupted and uneventful convalescence. His physical condition has greatly improved since the operation. He has put on twenty pounds in weight.

DISCUSSION.

DR. BRAUN said he had been much interested in one point in the history read by Dr. McCoy—i. e., that he found a positive fistula reaction with a dead labyrinth. Dr. Braun said he did not see how that could occur. A fistula reaction is a physiologic response to stimulation of a functioning labyrinth. He would be interested to know what explanation of the phenomenon Dr. McCoy had to offer.

DR. McCOY replied that it was not a typical fistula reaction, but after pressure was made for some seconds there was a slight twitching of the eye, and it was thought that some of the nerve endings were not quite dead. It was only a slight flicker, not a typical fistula. When the labyrinth was exposed granulations were found lining the large opening in the external semicircular canal. It was the largest fistula he had ever seen. The whole outer wall was eroded.

Paper: **The Pathology of Sinus Thrombosis.***

BY ALFRED BRAUN, M. D.

DISCUSSION.

DR. BLACKWELL said that the paper was a most timely and interesting one, and had brought up the wide variety of clinical symptoms in sinus thrombosis which can only be accounted for by the extremely varied clinical pictures. Some ten years ago he had himself reported two cases of sinus thrombosis, in one of which, an acute otitis, the clot formed in seventy-two hours and was found to have extended back as far as the torcular and facial vein—in seventy-two hours after the first clinical symptoms. In the other case the thrombosis had existed for a number of months, and at the time of operation the sigmoid sinus was nothing but a sloughing band.

DR. W. W. CARTER called attention to the very interesting experiment mentioned by Dr. Braun—that of causing thrombosis in the vein by the application of infectious material to the outer surface of the vessel. It would seem that under such circumstances there would be a thrombosis in the vein in every case of perisinus abscess, whereas we frequently have perisinus abscesses in which we do not have thrombosis of the vein.

He also offered an explanation as to why the vein is empty below the thrombosis. It is probably due to the fact that there is a slight negative pressure normally in the veins of the neck.

DR. BLACKWELL asked if he was correct in understanding Dr. Braun to say that the introduction of a sterile instrument into the veins did not lead to the formation of a clot. Of course, if that were the case, it would argue in favor of puncturing the vein with a needle at the time of operation, in order to determine in certain cases whether there really was a clot. He himself had always thought that that was a good way to start a clot, but did not know whether that had been demonstrated.

DR. BRAUN, replying to Dr. Blackwell, said that the results of experiment showed that when a vein was punctured by a

*See page 461.

sterile instrument, and the operation was done under aseptic precautions, a minimal clot was produced—a few blood platelets were found at the edge of the wound; after a while there was organization, and nothing further occurred—no infected thrombus was formed, nothing pathologic. If bacteria are injected into the circulation, and a vein in some other part of the body ligated or injured, a thrombus is formed at the point of ligation. Bacteria injected into the circulation where the vessels are normal do not cause a thrombosis; the circulation disposes of the bacteria. The explanation of the fact that we sometimes get thrombosis as the result of accidental injury to the sinus at operation is probably owing to the fact that bacteria enter the sinus at the site of operation, in addition to the fact that the sinus is collapsed by the packing used to control the bleeding. If we could disregard the bleeding and not compress the sinus, the probabilities are that we would rarely have a thrombosis resulting from injury to the sinus.

Replying to Dr. Carter's inquiry as to why a thrombus does not always occur when there is infected material about the sinus, Dr. Braun said that experiments showed that thrombi result sometimes when infected material is placed over a sinus, but not always; they are more apt to occur after long contact of bacteria with the sinus wall. The sinus wall itself is one of the best means of protection for the interior of the sinus. It becomes very much thickened when there is a perisinus abscess over it, and is covered with granulation tissue, being sometimes ten to twelve times its natural thickness, and so offers resistance to the passage of bacteria through the walls. Common experience shows that sinus thrombosis is present most often when the outer sinus wall appears almost normal. When the sinus wall is covered by thick granulations the interior of the sinus is usually normal.

As for the explanation of the collapse of the internal jugular vein, if Dr. Carter's proposition held good, there would be a collapsed vein in every case in which the clot extended below the entrance of the facial into the internal jugular vein. This is not the case. In many cases the internal jugular vein is full of blood. The most probable explanation is that an inflammation occurs around the veins—a perijugulitis—and this results in collapse and obliteration of the vein.

Paper: Otogenous Brain Abscess, With Hemiplegia and Aphasia; Radical Mastoid Operation; Cerebral Drainage; Decompression.*

BY OTTO GLOGAU, M. D.

DISCUSSION.

DR. HERZIG asked whether a spinal cell count was made, and whether the condition was a neuritis or a choked disc.

DR. GLOGAU replied that a cell count was made showing a decreased number of cells (polynuclear). The condition was an optic neuritis, not a choked disc.

DR. MACKENTY said that Dr. Glogau was to be congratulated not only on the results obtained but on the excellent report presented. It is not often that one hears a case so concretely and well stated. It was as clear as a piece of glass, and one seldom has the pleasure of listening to such a report.

DR. GLOGAU also considered hernia of the brain to be a consequence of the diseased condition of the adjacent brain tissues. He had not amputated the protruding masses of brain tissue, as they sloughed away. However, he prevented a prolapse of the healthy portions by means of pressure, application of semisolid paraffin nets underneath, which, by means of the application of scarlet red ointment, the protective dermatization of the exposed brain portion took place rapidly. The cerebrospinal fluid showed decreased lymph count and albumen.

*See page 456.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL
SOCIETY.

Meeting of February 19, 1918.

THE PRESIDENT, DR. FRANK ALLPORT, IN THE CHAIR.

Paper: **Indications for Variations in Technic in Tonsillectomy.***

BY CHARLES L. ADAMS, M. D.

DISCUSSION.

DR. OTTO J. STEIN congratulated the author and thought he had grasped the subject exceedingly well. He thought his classification of tonsils was accepted by all. There was one addition to the classification which the essayist had failed to recognize, but which he thought men who were doing this type of work should include. The specialist frequently saw the ill result of operations performed by fairly good operators and particularly those performed by men who were not especially well acquainted with the throat, and the result was sometimes very poor. He referred to the type of case which had been operated upon and pieces of tonsil or small masses of lymphoid tissue had become buried in the scar tissue. Specialists saw such cases frequently, and in some instances the tonsil had been taken out with the capsule remaining intact and this tissue afterward took on hypertrophic growth and the patient had to be reoperated. It was sometimes difficult to tell what the patient had had done. In these cases the question of the instrument to use was very important. Most of them had to be resected. He had seen several such cases, one of them being a case which was seen by Dr. Sluder when he was first demonstrating his instrument at the county hospital. One of the cases had been operated upon, and it was impossi-

*See page 474.

ble to use the instrument, for there was practically no tonsil tissue to be seen. They all tried to use the Sluder instrument, and besides attempts were made to dissect out the tissue, but it was found that the newly formed tissue around the aponeurosis contained small pus pockets, and it was only by painstaking work that it was dissected out. These cases come up frequently in private practice and in the clinic, and there was a question as to whether there was really any tonsil tissue present or not.

He cited the case of a patient seen that day in which the patient said she had had her adenoids taken out and was not sure whether the tonsils were taken out or not. She had a lot of trouble and he felt that there undoubtedly was lymphoid tissue buried in the scar tissue which had to be dissected out. He believed this type of case should be taken into consideration.

DR. JOSEPH C. BECK said there had been so much tonsil discussion last year that he supposed everyone was satiated with the subject. He thanked Dr. Adams for the compliment he had paid the Beck tonsillectome in his paper. He thought there was another type of tonsil which had not been mentioned—namely, the tonsil which had had a great many peritonsillar infections with abscesses that had been opened and drained. Those cases presented special difficulties in removal. In many of these cases and cases of the type mentioned by Dr. Stein he had been surprised to find that he could deliver them into a very small ring of the snare, although he had thought they would have to be dissected. He believed the careful dissection under local anesthesia still held first place for adults; he still liked to dissect the small flat tonsils from their attachment. He was interested in the opening words quoted from Dr. Fletcher, and also in the remarks frequently heard from Dr. Kenyon on preservation of the tonsil tissue, and particularly the capsule. Dr. Beck had frequently spoken of the intracapsular operation—meaning by that leaving the capsule intact, in place, and obtaining a perfect tonsillectomy, and he was prepared to demonstrate that operation to anyone who would take the trouble to see it. It meant the delivery of the tonsil with the ring instrument up to the time of twisting it off, and while the cauliflower mass of lymphoid tissue

was protruding, the capsule turned upon itself. The lymphoid tissue was removed with an instrument as employed to express for traucoma bodies. In this way there was nothing left but the trabeculæ and capsule. He was sure everyone operating on tonsils had been surprised upon removing a small tonsil to find a large cavity. This was not surprising to him, knowing that the constrictor muscles of the pharynx were intimately adherent through the aponeurosis to the capsule, and when the capsule was removed, like the raphe of any muscle, the tissues would spread. It lost the attachment, and the action of the muscle was in the opposite direction. He believed in the cases of vocalists where the voice was of high potential value one might develop the technic of intracapsular tonsillectomy, but he was not yet ready to make any final statement and certainly not willing to substitute the regular tonsillectomy with capsule intact, especially in cases of chronic tonsillar disease with systemic conditions probably due to it.

DR. ELMER L. KENYON stated that he was taking care of a young woman of twenty-two who had just begun vocal training. Her tonsils had been removed quite a number of years before. On the left side the anterior pillar was firmly adherent to the posterior pillar for most of its extent; the posterior pillar on the left was intact. On the right side the anterior pillar was intact as far as he could tell; the posterior pillar with its palatopharyngeus muscle was practically destroyed. There was no injury to the speaking voice, but the palate was deformed and operated in an oblique manner. He did not know how much this would interfere with the development of her voice, and no one knew at this stage of the development of the subject, but as scientific men they all know that the muscles of the throat should not be injured if it could be avoided.

As to the throats of children, after operation for tonsillectomy, one saw throats like this one or resembling this, in the great majority of cases. Fortunately, the palate was not the primary seat of the voice. If the larynx instead of the palate were involved in the operation, such operative results would be unthinkable. Dr. Makuen was absolutely correct, however, in insisting that the voice had a right to be heard in tonsillectomy, although because of anatomic considerations

he could not sanction Dr. Makuen's operation. When adenoids were removed one did not remove any extensive capsular structure, because there was no complicated muscular structure beneath requiring support. The function of the capsule of the faucial tonsil was to support the faucial muscles. In doing a tonsillectomy, in the great majority of cases the anterior pillar must be destroyed; this was unavoidable. Fortunately, that appeared not to be a very serious matter from the standpoint of the speaking voice. The palatal muscle was usually a small muscle, and its function was to regulate the more delicate action of the soft palate, especially in singing. Dr. Makuen had said the palatal muscle was a highly developed muscle in singers, but Dr. Kenyon could not confirm that statement from personal observation. There was nothing on record in the way of proof to show that an intracapsular operation might not be developed which would be of equal value, from the standpoint of removal of infection, to the extracapsular operation. For years operators had done more or less crude tonsillectomies, but never during that period had conceived of the idea of taking out all of the lymphatic tissue. The capsule was not the diseased part; he had examined fifty or more cases very carefully and had found no evidence of capsular infection. The surgeon had jumped from a crude tonsillotomy to a complete tonsillectomy, without first finding out whether a thorough operation done intracapsularly would not serve fully as well as the more radical and dangerous tonsillectomy. So until it had been shown that a thorough intracapsular operation was incapable of doing practically as well as the extracapsular operation, tonsillectomy was on a shaky foundation. He had carefully dissected out the lymphatic tissue within the capsule in a few cases, an operation he called "intracapsular lymphoidectomy." The result of this, after watching the patients for a long period, was that the deformity was very slight and there was no suggestion of lymphoid tissue so far as he had observed.

DR. STEIN had felt it necessary to call attention to the necessity for taking into special consideration tonsillectomized throats because of the diseased lymphatic tissue remaining in many cases after operation. They all know this to be true

—they too had dissected out lymphatic tissue in such cases. Then why be so troubled by an intracapsular operation which might possibly leave a little lymphatic tissue? He thought we should not be too dogmatic in the conclusion that the extra-capsular operation was the necessary operation for all tonsils.

Another "special indication for variation of technic" in tonsillectomy was in the cases of vocalists; of course one naturally should give the most careful consideration to the tonsils in the vocalist, from the standpoint of possible deformity. And he wished to bring forward this important and yet difficult consideration: namely, all palates were not of equal length. Some short palates which do not appear deformed are incapable of reaching the posterior wall, and the voice consequently is permanently nasal. Other soft palates are relatively short but adequate. If it was discovered through observation that the palate appeared to be relatively short, one should beware of doing tonsillectomy in that case, because a tonsillectomy almost regularly diminished the backward reach of the palate. He did not know how many cases of permanently nasalized speaking voice he had seen following tonsillectomy—not a large number, considering the whole number of tonsillectomies done—but he had not seen nearly all there were; and as the operation was being carried on now, operators were systematically making nasal speaking voices, and he believed it was a matter which ought to be considered.

DR. J. HOLINGER said there were two points which had occurred to him: one was that it must not be forgotten that the tonsil is a secondary organ, a lymphatic organ, carrying lymph from the nasopharynx, and that trouble up there—no matter how carefully and completely the tonsil was removed—was likely to cause difficulty again with lymphatic tissue of one kind or another. Gerdes long ago showed that the hypertrophic lateral strands in the pharynx were new formed tonsil tissue with all the characteristics that belong to it. In the treatment after removal of tonsils those parts of the pharynx should not be neglected. Suppurating processes in the nose and nasopharynx should not be overlooked, and in this way the work of the specialist might be made superior to that of the general practitioner in cutting out tonsils.

The second point was this: The scar does not always correspond to the amount of injury. In two patients with identically the same incision one might have an almost invisible scar, and in the other there would be a clumsy, thick scar almost like a keloid. In such scars little masses of lymphoid tissue which in one would simply be absorbed, may produce in another person a great deal of irritation. The operation and the operator cannot be blamed for all the bad results.

DR. CHARLES G. ADAMS, in closing, thanked the society for the honor shown him in admitting him to membership and for the discussion given the paper. He thought if there was no discussion at all a paper fell flat, and if the discussion tore the paper to pieces the author felt badly, so he thought he had fared very well.

DR. CHARLES M. ROBERTSON discussed some investigations which he is carrying on in connection with aviation tests, and illustrated his talk with charts.

MID-WESTERN SECTION, AMERICAN LARYNGO-
LOGICAL, RHINOLOGICAL AND OTOLOGICAL
SOCIETY.

MEETING AT BOULDER, COLO., FEBRUARY 23, 1918.

**Abscess of the Left Frontal Lobe Following Suppuration of the
Frontal Sinus; Report of a Case and Exhibition of Specimen.***

W. V. MULLIN, M. D.

DISCUSSION.

DR. F. E. WALLACE said that in all cases of colds and nasal infections we should insist on having early treatment. Early treatments may possibly mean abortive treatment. The public should be made conversant with the dire results of neglect. If, as is true, we have an infected sinus as the origin of the brain abscess, then it is very necessary to begin treatment early, and that an early operation be done to give free drainage, so that pressure may not cause necrosis.

We all know that infection can spread by direct communication, but also, in many cases, it no doubt spreads by way of the vessels. Then, too, an infected embolus or a thrombus can be given as a cause, as is also true of cholesteatoma. By direct extension from caries or necrotic degeneration, the dura becomes inflamed; throws out plastic material; becomes attached to the bone; and thus abscesses form. If we are dealing with an infection from the influenza bacillus there is more reason for haste in early treatment and early operation, because of the intensive destruction of bone tissue.

The signs and symptoms are not always very well marked. Headaches and temperature may be very slight or entirely missing. The headaches are generally referred to the affected side. Chronic inflammation, thickening or adhesions of the meninges covering the cribriform plate is a probable cause for the persistent and incurable headaches. All the frontal

*See page 667.

lobe, in front of the coronal suture, presides only over the intellectual functions, so the only symptoms we may have might be some dullness of intellect. Reports of cases would seem to indicate that an abscess can be present in the frontal lobe indefinitely without presenting any symptoms. So also can the destruction of the brain tissue be enormous without creating cerebral symptoms. The lack of symptoms, or indefinite symptoms, may therefore be exceedingly confusing.

Sharpe thinks that the symptoms we do get are chiefly from pressure, rather than from the necrosis or destruction of tissue. That this pressure creates an edema of the surrounding tissue, causing dural tension, and at this pressure an edema is greater at times, and we thus get the characteristic periodicity of the headaches, nausea, vomiting, etc. He thinks also that the intracranial pressure during these attacks is generally registered in the fundus of the eye, viz., edema and haziness of the disc and dilation of the veins.

DR. W. F. CALLFAS of Omaha: I would like to mention the fact that I have seen several cases of brain abscess in the last few years. One that I have in mind just now is one that Dr. Gifford had a year ago which terminated fatally. The X-ray does not always show the presence of an abscess in the brain; at least, it did not in some of these cases. Another thing, if you insert your needle, if the pus is thick you are not going to get the pus, at least that has been the experience in our cases. Dr. Gifford devised an instrument which he inserts, and as he penetrates he separates the blades and makes a wide separation. If there is any pus at all you can see right in, no matter how thick it is—you can see the pus and it will come out. Most of the cases that I have seen have been Dr. Gifford's cases and most of them recovered.

DR. C. A. RINGLE: Was that a *staphylococcus aureus* infection? Dr. Mullin replied that it was reported as such by the bacteriologist.

My experience has been, and I have read in different authorities, that the *staphylococcus aureus* has a special tendency to attack the bone, and my experience in treating yellow *staphylococcus* infections of the middle ear and the mastoid, and wherever else I find them, is that they have been very persistent in their tendencies.

DR. ROBERT LEVY: I would like to ask Dr. Mullin if the two sinuses had a septum between them. Dr. Mullin replied that there was a septum and that it was in the median line.

Dr. Levy asked if it was complete, to which Dr. Mullin replied it was.

That is rather an interesting feature because of the conclusion that Dr. Mullin has arrived at as to the amount of trouble on the opposite side, the one showing the greater symptoms. Another interesting feature is the nature of the infection, giving rise to such extensive and rapid involvement. The abscess was evidently an acute one, judging from the symptoms, for we know that cerebral abscess manifests itself in three stages, the first, the second or latent stage, and the final stage. It is usual for no symptoms to manifest themselves during the latent stage, and this is particularly true when involving the frontal lobe. If the diagnosis can be made the case is entirely an operable one. The patient's symptoms having been alleviated, he did not present himself for observation, which, of course, added materially to the difficulties Dr. Mullin had to contend with.

DR. H. L. BAUM: I would like to ask Dr. Mullin if the bacteriologic diagnosis here presented was made from a smear or culture. Dr. Mullin replied both.

The point Dr. Levy mentioned, that it is not usual to find such extensive destruction from the staphylococcus, is, of course, true. The probability is that the staphylococcus was secondary. The abscess was evidently not an acute condition, because if it were the patient would have had more symptoms than he manifested. A slower formation, possibly extending over a period that was not thought of at the time the case was being treated, would permit the secondary infection which nearly always takes place in chronic abscess formations when in communication externally, and such infection is usually staphylococcus. I know of a few cases of brain abscess, of middle lobe and cerebellum, that I have had occasion to post, and all have either been sterile or staphylococcus, although probably originally streptococcus.

DR. D. A. STRICKLER: Another point raised by these gentlemen in their discussion is the inability to discover by the X-ray the abscess of the brain. I am not prepared to report fully the

case seen within the last year, but it was one in which I had quite a good deal of interest. I was called out to see a gentleman one morning who had a great deal of pain on the left side of his head, and I found that he had a chronic ear condition. My tentative diagnosis was cerebral abscess; he had a pressure pulse, and there were very few symptoms outside of this and the pain. I had Dr. Moleen see the case, and he said there were no symptoms of brain lesion that he could determine. The man improved quite rapidly after free incision of the drumhead. I don't know that we got any particular discharge or had any particular reason for expecting rapid improvement. I did it only as a precautionary measure. He was allowed to go home, and after a couple of days his pain began very severely again. He was again sent to the hospital, and Dr. Moleen again went over the case with negative findings, and I had an X-ray made and the findings in that were negative. I did not feel that we were justified in doing any surgical work, although I had a surgeon ready for the work and the ear cleaned up. The man developed epileptiform attacks. In fact, I learned he had epileptiform attacks before. Subsequently, he went into the country hospital, became insane and died. An autopsy showed the abscess and the usual position of temporosphenoidal. I was interested particularly to know what has been the experience of members of this society on the reliability of the X-ray examinations of similar cases and to what extent we would be justified in going in on a clinical diagnosis of cerebral abscess without X-ray findings or localizing symptoms.

DR. W. V. MULLIN: I think Dr. Wallace's point about instructing the patient concerning the necessity of taking treatment in sinus cases and of some of the complications that may follow suppuration of the sinus is a very good one. Dr. Wallace said he had never had a case of brain abscess, and this is the first abscess following frontal sinus disease that I have had in my practice. I saw one case in consultation and saw the postmortem of an abscess following an erosion in the sphenoid sinus; but one does not think of it as being a probable complication in low grade infections like this one was. I have had very severe infections of the frontal sinus, one in particular in a woman with the most enormous frontal

sinus I have ever seen. I worried daily about her developing either a meningitis or a brain abscess because of the very severe pain and because of it being a pneumococcic infection. But this young chap, as I remarked in my paper, was indifferent about coming back. Perhaps I was indifferent in not insisting upon it, and so I think Dr. Wallace's point is a very good one, and one that has been brought home to me by this case.

In reply to Dr. Baum, I would say that the cultures were obtained very soon after the patient died, as the postmortem was done very soon after death, and the bacteriologist reported a pure and uncontaminated culture of the staphylococcus aureus.

In reply to Dr. Ringle, I think he is right in his statement that the staphylococcus aureus has a selective affinity for bone and causes great softening and destruction and is quite often the offending organism in osteomyelitis.

DR. CALIFAS spoke of the X-ray not being of much value in these cases and referred to the value of Dr. Gifford's brain explorer. I have seen the instrument but have never used it. Having a complete cessation of the pus from both sinuses and having seen them discharging freely before, with an increase of the headache over what he had previously had, I think a good stereoscopic picture might have shown a softened area in the bone and prompted external surgical interference. This would have revealed the fistula leading into the brain cavity, as in Krause's case, and exploration made for the abscess and drainage obtained before the pus ruptured into the ventricles might have saved his life.

Experimental Work Upon Accessory Sinuses of Cats.

W. V. MULLIN, M. D.,

COLORADO SPRINGS.

An incision was made over the right brow and a small hole drilled in the anterior wall of the right frontal sinus. A hypodermic needle was introduced, and a few drops of alcohol injected to produce irritation, in the hope of closing the naso-frontal duct. This was followed by violent sneezing, although the cat was well under ether. About one cubic centimeter of

India ink was then injected. There was considerable back-flow of ink around the needle, but no escape from the nose.

After four days the cat was chloroformed and autopsied. The sinus was found well filled with ink, which could be seen to penetrate the posterior bony wall at many points and infiltrate the subjacent dura. No discoloration was detected in the pia nor elsewhere in the cranial cavity. There was seropurulent exudate in the nasal fossa, but no ink.

In several other cats injected in this way there has been slight infiltration of the posterior bony wall of the sinus, but in no other case has it been so pronounced.

In one cat the needle was pushed through the posterior wall and the ink injected into the cranial cavity. At autopsy the entire pia of the brain and medulla was deeply discolored, the pigmentation even extending down into the pia of the cord. Microscopic sections of the cerebrum showed carbon packed in the lymphatics of the pia on the surface of the brain, following the convolutions, and even carried into the depths of the brain in the perivascular lymphatics.

Bone Transplantation for Correction of Nasal Deformities.*

W.M. F. CALLFAS, M. D.,

DISCUSSION.

DR. J. N. FOSTER: This paper is a very interesting one, as it shows us the way the new methods have taken the place of the old. We can remember the time when these plastic operations were done largely through transplantation of the skin or the insertion of a plate of metal or other substance. I expect most of us have had the pleasure or duty of removing one of those various plates that have been put in the nose. We have always felt that they necessitated two operations: one, putting them in, and some time later, the second operation of taking them out, as they would nearly always produce irritation. A great many substitutes have been tried and a great many different methods of operation have been undertaken. I think it is largely on account of the failure in some of these cases that we are always seeking something new; but I believe that the bone transplantation is the operation that

*See page 672.

is to be done practically altogether in the future. Especially, where it is done with the periosteum left on the bone, because we know in that way it is better osteotomy. The operation has been very successful, as the doctor states, and these photographs of patients must be very gratifying to him as well as the patient. I have not seen this operation done, nor have I done that kind of work personally, but I removed plates some years ago, that had been put in the nose, and have done plastic operations. However, if I had a patient who needed this work done, I certainly would insist upon it being done as the doctor has described.

DR. W. F. CALIFAS: Since I saw Dr. Jos. C. Beck do his operations several years ago, I have taken up Dr. Wessley Carter's plan of using the rib instead of the tibia. You can readily see that gives the advantage of having more flexibility, and it is an advantage over the other. I want to say in this one case, the most marked case of the two, it doesn't show the whole deformity; you have a side view. In this case there was dipping down between the two nasal processes, an actual dipping down, so that you had to reach down and pull the skin up to bring it to a level with the two supports. You can readily see why he could not get a prominent position. The other case was about as the picture shows. (Referring to photographs.)

Note on Dissection of the Anterior Pillar for Opening Some Peritonsillar Abscesses.

W.M. C. BANE, M. C.,

DENVER.

In a large percentage of the cases of peritonsillar abscess the pus is deposited in the anterior superior position. In not a few of these cases the collection of pus is well anterior, producing bulging close to the upper attachment of the plica. It is in just such a case that the operator can reach the pocket of pus by separating the anterior pillar from its attachment to the tonsil, and obtain entrance into the abscess for drainage. It is desirable to endeavor to anesthetize the tissues by the application of a ten per cent solution of cocaine and then the

injection of a few drops of a one-fourth per cent solution of cocaine where the dissection is to be made.

It is more difficult to anesthetize the inflamed tissue than the normal tissue, as absorption is slower in the former. Having gained entrance into the pus, the opening can readily be enlarged by insertion of a hemostat or probe pointed scissors and spreading the blades. In rare instances the operator can complete the dissection and snare off the tonsil, as I did in one case about a year ago. In this case the tonsil was small, a part having been removed at some previous time, and in opening the abscess so much of the gland was severed that I did a little more dissecting and applied the snare. The soreness was seemingly prolonged by the leaving of the greater area exposed than would otherwise have occurred. However, it was a complete cure for that patient.

DISCUSSION.

DR. C. A. RINGLE: The route which Dr. Bane follows in opening these abscesses is manifestly a very natural and a very inviting one. In a number of cases I have found the pus pocket by taking this route. Now, I have found, of course, as Dr. Bane has, that there is great difficulty in anesthetizing these parts. Any manipulation of the tonsil is always painful and very difficult to alleviate. The way in which I palliate the pain is by explaining to my patient that the inflamed tissues are not very sensitive, especially to a small needle knife. If you press upon the tonsil with the finger it is painful, but there is very little resistance to a fine, sharp knife and it is not so painful. That is the way I get around the anesthesia. I am not successful in using cocaine. Of course, after the tonsil has been sufficiently manipulated and handled, as it is necessary to relieve an abscess by Dr. Bane's procedure, I presume it is only another and insignificant step to remove the tonsil, although there is some question as to the advisability of removing an inflamed tonsil.

DR. D. A. STRICKLER: The method of anesthetizing I use, and I think successfully, is to take equal parts of cocaine, carbolic acid and menthol. They make a very thick syrupy solution. This is applied over the point of incision. I am sure it will relieve the pain to a large extent.

DR. W. F. CALIFAS: I am sure the doctor's method is a very good one. Just as the doctor expressed himself here, I think if there are symptoms to be observed, we ought to get rid of the pus. I was trying to think of a doctor in Iowa who was at a meeting in Sioux City. He has an especially devised instrument whereby he separates the pillars from the tonsil, and he claims that in more than ninety per cent of the cases it is absolutely unnecessary to remove the tonsil. He separates the pillars from the tonsil and he says he gets good drainage. My practice has been, whenever I have found diseased tonsils with enlarged cervical glands, to remove them.

I would like to suggest a local anesthetic: If you make that equal parts of cocaine, phenol, menthol crystals, and camphor gum, you would have four instead of three. The camphor will neutralize the bad effect of the carbolic, and I think the anesthetic works really better that way than it does without it.

DR. J. N. FOSTER: When Drs. Bane and Ringle can use this hypnotic effect upon peritonsillar cases, I am very much interested. So far as my experience goes, I have to open it just as quickly as I can and make as free an opening as I can, and that is about all they are going to stand. I have not been in the habit of putting patients to sleep for doing this work. I have tried cocaine and you can use it exactly in the same way as you use it in noninflammatory cases and with no effect at all. It is so inflamed that you cannot anesthetize. I have found in almost all cases the point of incision is a little bit down from the apex under the anterior fold; about one-third of the way down. I use a good strong lance knife, with double edge, and make a good free opening. It can be done quickly.

That brings up the point, too, I think you have all noticed, as to when to open a peritonsillar abscess. I find that as a rule my patients are pretty well out of patience with me when I get ready to open it, because they want it done immediately. We know, in all probability, that the infection has gone through a crypt and it is difficult to reach when it is small. I find that if an attempt is made to open it early we are very frequently unsuccessful in getting free discharge of pus. I have never attempted to take out an acutely inflamed tonsil, but I am curious to know from Dr. Bane if there was any

unusual amount of trouble or bleeding at the time this tonsil was snared out. Dr. Bane made apologies for the few notes, but his paper was very interesting and important to this society.

DR. F. E. WALLACE: Dr. Foster just asked Dr. Bane a question I had expected to ask him as to his opinion regarding the taking out of a tonsil in an acutely inflamed condition. I recall a case I recently operated upon in which I had attempted, under local anesthesia, to open into the abscess, and in which the patient, in spite of the injection of cocaine, would not stand for it. So, after having suffered with pain for a day or two longer, he finally consented to a general anesthetic. Both tonsils were actually inflamed, and one had a peritonsillar abscess. I went into the abscess and evacuated about a tablespoonful of very foul pus. I then proceeded to take out both tonsils. I had an extreme amount of bleeding, but recovery was uneventful, and the patient apparently recovered as quickly as in any ordinary tonsil case.

I have made it a habit to paint the raw surface with five per cent solution of iodin after a tonsil operation, with the thought in mind of preventing any infection by sterilizing the surface.

DR. ROBERT LEVY: This is an extremely interesting topic. The point made by the last speaker as to the advantage of this particular operation is a pertinent one, and I take it that Dr. Bane feels that by removing a portion of the tonsil he not only opens well into the abscess cavity, establishing free drainage, but also prevents recurrence of the peritonsillar abscess. As a matter of fact, I think the first point is one upon which we may rely, but I think the same may be accomplished by making a large incision with a sharp knife and then spreading the wound by a pair of hemostats. As to the second point, namely, the prevention of recurrence following this method, this can be true only to a certain extent, for while the majority of cases of peritonsillar abscess are the result of infection carried through the upper pole, this is not always the case. Even after a fairly successful tonsil operation one not infrequently finds that a few remaining follicles or a small amount of tonsillar tissue has been left. Through this lymphatic tissue it is not impossible for infection to take place, resulting in abscess in the adjacent tissue.

DR. W. V. MULLIN: Dr. Levy alluded to Dr. Bane showing

us the method of opening peritonsillar abscess some years ago, and I have always thought that the method of using the Hartman forceps was an ideal one. Drs. Wallace and Bane brought up one point that I should like to hear some further discussion upon, and that is the advisability of operating upon certain acute cases. I have felt that in well defined indications one should go ahead with the operation during the acute stage. I recall one case in a young woman where a peritonsillar abscess had been opened by her general practitioner three times. When I saw her she had a peritonsillar abscess on both sides which I opened, and they promptly filled up again. The throat was pretty well scarred, and she looked decidedly septic; was running temperature and had albumin and casts in the urine. I removed both tonsils under general anesthesia. I had a little more bleeding than ordinary; but the girl made a good recovery, and I feel that she would not have done so otherwise. In another case, a girl sixteen years old had tonsillitis and was taken care of by her family physician. When he called me there was nothing to be seen on the tonsils, but she had a large tender gland on the right side; had a temperature of 105; was partly delirious; had pains in the joints, and was developing a heart murmur. The gland was aspirated from the outside and nothing obtained. I removed the tonsil on the side of the infected gland, with no undue bleeding, and the girl made a good recovery. I would like to hear from anyone who has had further experience along this line. If you can get good drainage and relief from opening a quinsy abscess, all right; but if not, and your patient is not doing well, why not remove the tonsil just the same as an acutely inflamed appendix?

DR. WM. C. BANE: In suitable cases the advantage is in being able to reach the abscess by dissection with very little distress to the patient. However, the method which I usually follow is the one advocated by St. Clair Thompson. That is, "If an imaginary horizontal line be drawn through the base of the uvula, and another vertical one along the anterior fau-
cial pillar, they will intersect above the tonsil. One or two centimeters external to this is the best point for opening the abscess." Finding a boggy area, with the point of a Hartman nasal dressing forceps, they are suddenly pushed backward

and outward until they enter the abscess, when the blades are spread and withdrawn, giving vent to the pus and producing an ample opening for drainage.

The Lothrop Operation for Frontal Sinuitis, With Report of Two Cases.*

JAMES J. PATTEE, M. D.,

DISCUSSION.

DR. F. L. DENNIS: I have had no experience with the Lothrop operation, and can only speak from what I have read. It seems to me to be a very useful means of approaching disease in this quarter, and I think Dr. Pattee's exposition of the technic of the operation has been very instructive. My own opinion is that I think Dr. Pattee is right on the point that we should not meddle too much with the linings of the sinuses. I think that sort of thing often results in more harm than good. In closing what little I have to say, I would like to ask Dr. Pattee if he will tell us a little more about his after-treatment following the operation, whether there is any drainage or not.

DR. F. E. WALLACE: I have had the privilege of seeing this second case Dr. Pattee spoke of, and the scar was so slight as to be unnoticeable.

In reference to the operation and the necessity for taking out part of the septum, it seems to me that would have to be determined by the particular case in which you are operating. You can easily imagine that a case like this, where you have the room that is shown here (indicating), it might not be necessary to take out the septum, because you would have good drainage. But supposing that you have an irregular frontal sinus and that the septum is off to this side, or that your angle here is closed. Now then, there are anatomic limitations to going out towards the eye, so consequently your drainage might be very imperfect. Inasmuch as Lothrop claims there is no reason why an opening into this other side should be detrimental, I see no reason why taking out part of this septum here should not be very advisable in order to get your free

*See page 677.

drainage that is essential for cure. As it was in this case, I think the operation is one of choice.

DR. W. V. MULLIN: I desire to show a photograph of a patient before and after operation upon whom I performed the Lothrop operation in 1915. I think it emphasizes what Dr. Pattee says about there being very little scar after the operation. The patient walked into my office with this orbital abscess broken through from the frontal sinus, which you see in this photograph. This operation impresses me very favorably in contradistinction to the Killian. There are so many elements to be considered in the Killian—one thing is the amount of deformity which may follow, and which means a good deal to the surgeon. I have heard Killian himself make the statement that he was not entirely satisfied with the operation and that too many of them returned in several years without a result or with a great deformity. You can at least say about the Lothrop operation that if you do not give the patient a perfect cure you do not leave him with an enormous deformity and an unsightly scar. The patient whose picture you see has been observed recently and has had absolutely no return of trouble. I am not convinced of the reason for removing the septum and opening into the other sinus if it is not infected.

Replying to Dr. Irvine of Salt Lake City, I would say that I worked in Halle's Clinic at the same time Dr. Ridges did and I have done the Halle intranasal operation, but I do not think that it would be at all applicable in the first case Dr. Pattee showed nor in the case I showed. In just such cases Halle himself would have done an external operation.

DR. D. A. VANDERHOOF: The keynote, I believe, in the healing of all these frontal sinus cases is simply one of free drainage. If you get good drainage, even with a small amount of operative work, you are fairly sure of getting a good healing. As Dr. Pattee says, all cases vary. Some of these cases, of course, it would not be possible to do the operation upon, which he has spoken of today, and so in these cases we would undoubtedly have to do the Killian or some similar operation. You take a case where the frontal sinus extends far over the orbit, the operation which Dr. Pattee has spoken of will not give you any results. The two cases which Dr. Pattee has

reported are very interesting, and we all should be benefited by his most interesting and instructive paper.

The doctor spoke of ether in these cases: In the more radical external operations, where the intranasal work has been done at some previous time in the office, I have always felt strongly in favor of nitrous oxid gas. The only objection to it is, in these cases you always get a great deal of bleeding, so you should use, previous to the operation, an injection of adrenalin to relieve excessive hemorrhage.

DR. J. J. PATTEE: With reference to the question of after-treatment and packing: I use no packing unless hemorrhage requires it. In general, I pack less and less after surgery in the nose. The patient reported, appeared very similar to the photograph exhibited by Dr. Mullin. This patient spent about three to five weeks in the hospital and home with each of his three previous intranasal operations, while after the Lothrop operation he was confined only a week.

The question has been raised about the danger of opening the opposite side. I do not apprehend any trouble from that source. It is a well known fact that much moderate acute sinus infection recovers without treatments; that quite severe cases subside on removing the anterior end of the middle turbinate, and nearly all cases heal after free frontonasal drainage. Why such anxiety over opening a healthy sinus whose nasofrontal duct is open? The gain in drainage greatly outweighs the risk of infection.

Dr. Irvine has raised the question of the Halle operation in my case. I did not regard the intranasal operation suitable for two reasons. First, the condition of the case made a successful intranasal operation seem very improbable. Second, the case had already had three intranasal operations without relief.

A New Instrument for Exenteration of the Anterior Ethmoid Cells.

FRANK R. SPENCER, M. D.,
BOULDER.

Since our instrumentarium is already overcrowded, the necessity for another instrument may seem doubtful to your minds, but, as those I have tried have not entirely fulfilled the requirements, I have ventured to introduce this one.

You will notice that this combines the curette of Mosher and the hook of Sluder. The latter is placed in the center of the bowl of the curette, as an additional aid in exenteration. The bowl of the curette is at a ninety degree angle with the shaft and is made to cut from above and behind, down and forward.

As Mosher's curette is intended for cutting backward, it is often desirable to have an instrument with which to cut forward, especially while removing fragments of the anterior cells. The bowl of Mosher's curette is at an obtuse angle with the shaft and cannot be easily used for cutting forward. In fact, if I interpret his article correctly, he did not intend to cut forward with his instrument. While a conchatome is a useful adjunct to the curette, it has its faults.

Perhaps if I had the master mind and hands of either Mosher or Sluder, I would not need this addition to my instrumentarium, but this has fulfilled some of the requirements not found in any of the others.

This instrument was made by V. Mueller and Company of Chicago.

DISCUSSION.

DR. W. V. MULLIN: I have looked at Dr. Spencer's instrument, and while it looks practical, I am sure those things get down to a matter of individuality, and Dr. Spencer had this devised to meet some requirement or some want that he has had filled. I am sure that I could tell very much better what I thought of it after I used it. I have used Dr. Mosher's curette and like it very much, and I am also much in love with Heath's small forceps for opening the ethmoids. I should like to try Dr. Spencer's instrument when I have the opportunity. As I say, I think it comes down to the instrument that a man is used to and what individual use he has for it.

DR. ROBERT LEVY: The instrument here presented seems to be very similar to the one known as the Grünwald curette. The curve and bowl are about the same, but the knife is entirely new. I have found that a curette set at this angle is of much help in doing what is known as the Mosher operation on the ethmoid.

The Surgical Treatment of Epistaxis.

FRANK R. SPENCER, M. D.,
BOULDER.

That certain types of epistaxis have long resisted conservative treatment is well known. That surgical intervention is often successful in the stubborn cases is now becoming well recognized. It is almost needless to state that surgical treatment is not applicable to cases of epistaxis due to acute infectious diseases, such as typhoid fever, pneumonia, or measles, nor is it applicable to a nasal hemorrhage, when due to the anemias, advanced arteriosclerosis with high arterial tension, etc. These cases should be treated by the internist rather than by the rhinologist. When repeated applications of strong iodin, nitrate of silver, Monsell's solution, and the chemical or electric cautery have all failed to check the recurrent attacks of nasal hemorrhage, surgical intervention is usually called for, especially in small children, who resent any form of nasal medication. Children should be operated under general anesthesia, but adults may often be operated under local, except in cases of neurotic individuals, who refuse to submit to any surgical procedure under cocaine.

Most authorities are not in favor of doing a submucous resection of the septum in children under thirteen to sixteen. It is usually necessary to apply this operation only to the bleeding point, even though the septum may be deflected. Leshire states that he very often finds septal hemorrhage in patients who have almost perfect septic. Such has not been the writer's experience. The vast majority of cases of epistaxis occur in people who have a sufficient deflection of the septum to call for operative intervention. For several years I had noticed improvement in crusting of the septum and septal hemorrhage following a submucous resection, but the full significance of this did not occur to me until I heard a paper by Dr. Chester C. Cott, of Buffalo, read before the section of otolaryngology of the A. M. A., in Detroit, in June, 1916. This paper was preceded by one by his father, Dr. George F. Cott, which occurs in the transactions of the American Academy of Ophthalmology and Oto-Laryngology for 1912, page 272. A more recent article upon this subject has appeared by

Leshure. Thompson and Prenn have also written upon this subject.

The method of operating is as follows: First, apply cocaine and adrenalin to the septum. Ten to twenty per cent cocaine may be used and is recommended by most authors. Personally, I prefer powdered cocaine. Injection of one-half to one per cent novocain in 1/20,000 adrenalin, under the mucoperichondrium, well above the ulcerated area, increases the anesthesia. If injected near the ulcer, it will probably not remain long enough to anesthetize.

Second, incise the mucoperichondrium well anterior to the ulcerated area. Hajek's incision in the mucocutaneous membrane may be necessary in some cases, and in others Killian's curved incision is better. An L-shaped incision has been used. In any case, this must be carried well down to the floor, so as to elevate all of the ulcerated area.

Third, elevate the mucoperichondrium well beyond the bleeding area on the side of the ulcer only. If both sides are operated at the same time, a perforation will result.

Fourth, either apply pressure with forceps in order to obliterate the tortuous vessels and pack, or packing without the former is usually sufficient. The pressure with forceps should not be great enough to endanger the vitality of the tissues, but only sufficient to obliterate the bleeding vessels.

While I have used this in a comparatively few cases (ten or twelve), and then only when it was necessary to straighten the septum at the same time, the results have been gratifying.

DISCUSSION.

DR. ROBERT LEVY: Although I have never practiced the procedure mentioned by the reader of this paper for the cure of recurring epistaxis, I have been impressed with the frequency with which this result is obtained after a submucous resection of the septum.

DR. J. N. FOSTER: In regard to this procedure I have done it quite a number of times, and I have been successful in some very obstinate cases. I can remember a special one, a case that I had of an old lady with high blood pressure; constant bleeding very annoying to her. I went to see her and did everything in the world I could in the way of cauterization,

and at last did this operation, and I think she got somewhat better. I was afraid to go back and find out.

**Relation of Blood Pressure to Pathologic Conditions of Head
and Neck.***

T. E. CARMODY, M. D.

DISCUSSION.

DR. ROBERT LEVY: This paper is, so far as I know, the only investigation of its kind that has been attempted, and I wish to commend Dr. Carmody for this very original thought of his. That some good will come of it goes without saying, for we have only to look at other branches of our science to learn that investigations along the line of blood pressure have been of much value. We have a great deal to learn regarding standards from which to draw conclusions, and possibly a continuation of this research will develop these standards so that one may draw certain conclusions. The relation of a high or low blood pressure to an operative procedure, in either a minor operation in the throat or nose or in a major operation, has, I believe, received too little attention. The statistics presented by the essayist may be criticised somewhat in that we do not gain so much for a determination of averages as one would have from first thought believed to be true. I believe more value could be attached to this research could the averages be taken between various ages instead of making the one average age of seventeen the basis of deductions. One might with advantage study the average blood pressure between the ages of two and five, between five and ten, between ten and fifteen, and so on up to adult life.

In speaking of nasal hemorrhage and blood pressure, we are all familiar with the rapidity with which nasal bleeding, resisting all other methods of control, stops as soon as the blood pressure is reduced. In some cases, however, it requires much judgment on the part of the observer to determine that a moderately high blood pressure is responsible for the bleeding in the presence of a local lesion. For example, I have been satisfied that in a number of cases in which the blood pressure was high, the patient having passed the age of fifty, the hemor-

*See page 691.

rhage came definitely from an eroded anterior septal artery. In these cases the bleeding was controlled by galvanocautery, blood pressure remaining high at all times.

Dr. Robert Levy presented an informal report dealing with statistical deductions from an examination of four hundred and thirty candidates for the aviation service. He also outlined the methods adopted by the examining units, showing in what respect an attempt was being made to standardize these examinations.

The Nose and Throat in Medical History.*

D. A. VANDERHOOF, M. D.,

DISCUSSION.

DR. ROBERT LEVY said the subject of medical history is one that must interest all of us. In following the history of a given medical topic from its earliest day to the present time, one obtains a much better understanding of it. While the older history of otolaryngology is interesting, to me that period of the history of our specialty beginning about the middle of the nineteenth century is most valuable. You will recall that at this time, namely, about 1856, the laryngoscope was discovered. This was the beginning of our present method of illuminating dark cavities, and the entire subject was given new emphasis by bringing the nasal and laryngeal cavities into the light of day. No department of medicine has made greater progress in the last fifty years than otolaryngology, and the advances are so important that a close study of the history of our specialty during this period is of great value.

DR. F. L. DENNIS said, with reference to the way the Hindoos felt about putting things in the nose, one of the instructions was that the patient do not get angry when they pushed his nose up and squirted some oil into it. It reminds me of a patient I had before doing nose and throat work. This man came in with a very painful boil on the end of his nose, and I put him in the chair so that I could see in his nose

*See page 685.

and put a knife into the boil, very much to his disgust. He went away and told somebody afterwards: "I didn't mind Dennis sticking that knife into me, but after he got through he pulled my nose and that made me mad."

DR. WM. C. BANE said we speak of the eustachian tube. The name eustachian doesn't mean anything to you except as you have learned to associate it with the tube. Why not "otopharyngeal tube"?

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